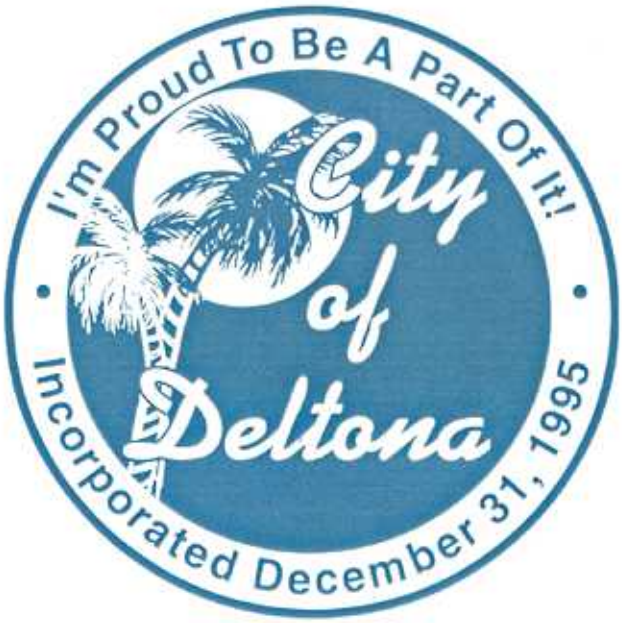

RESIDENTIAL LOT GRADING GUIDELINES

Effective October 31, 2003

RESOLUTION NO. 2003-16

A RESOLUTION OF THE CITY COMMISSION OF THE CITY OF DELTONA, VOLUSIA COUNTY, FLORIDA, ADOPTING THE RESIDENTIAL LOT GRADING AND DRIVEWAY GUIDELINES TO BE USED AS STANDARDS OF THE LAND DEVELOPMENT CODE PURSUANT TO SECTION 96-26, CODE OF ORDINANCES, CITY OF DELTONA, FLORIDA; AUTHORIZING THE DEPARTMENT OF DEVELOPMENT SERVICES TO ADMINISTER AND ENFORCE THE STANDARDS IN THE GUIDELINES, AND PROVIDING FOR APPEALS AND VARIANCES USING THE PROCECURES ESTABLISHED IN SECTION 96-27 CODE OF ORDINANCES, CITY OF DELTONA; PROVIDING AN EFFECTIVE DATE.

WHEREAS, the City of Deltona has experienced significant storm water management problems as a result of periods of both heavy rainfall of short duration and long-term soil saturation from persistent rains and high ground water levels; and

WHEREAS, a large percentage of the City of Deltona is platted for single-family residential development; and

WHEREAS, the historical development of Deltona prior to the time it became an incorporated municipality did not result in a completed primary and secondary storm water drainage system; and

WHEREAS, widespread and often significant problems have occurred in the City of Deltona as a result of a long history of poor coordination of small lot development; and

WHEREAS, the Florida Department of Health established a uniform state-wide approach of evaluation septic tank drainfields that resulted in elevated drainfields; and

WHEREAS, the construction practice in response to the Department of Health requirements for septic tanks was the creation of elevated lots that worsened local drainage problems and created widespread citizen complaints about the building practice of elevating lots

to achieve gravity flow to septic systems without due consideration of the character of the surrounding terrain and development; and

WHEREAS, the City has received numerous complaints about improperly constructed residential driveways and has observed driveways with excessive grades and improper drainage design; and

WHEREAS, the City Commission of the City of Deltona on February 21, 2000, adopted Ordinance Number 01-00 to address these problems; and

WHEREAS, experience with implementation of Ordinance Number 01-00 has demonstrated a need for more specific standards; and

WHEREAS, the City staff, engineering consultants, and the Volusia Homebuilders Association have worked together over many months to produce a final draft of residential lot grading and driveway guidelines;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COMMISSION OF THE CITY OF DELTONA, VOLUSIA COUNTY, FLORIDA, as follows:

SECTION 1. That the City of Deltona Residential Lot Grading and Driveway Guidelines dated September 15, 2003, a copy of which is attached hereto as Exhibit 1, are hereby approved and adopted as supplementary regulations to the Land Development Code, as provided in Section 96-26, Code of Ordinances, City of Deltona.

SECTION 2. The Department of Development Services shall administer and enforce the Residential Lot Grading and Driveway Guidelines using the procedures for administration, enforcement, variances and appeals established in Section 96-27, Code of Ordinances, City of Deltona.

SECTION 3. That this Resolution shall become effective immediately upon its adoption.

PASSED AND ADOPTED BY the City Commission of the City of Deltona, Florida this 15th day of September, 2003.

John Masiarczyk, MAYOR

ATTEST:

Faith G. Miller, MMC, CITY CLERK

Approved as to form & legality for use and Reliance by the City of Deltona

L. Roland Blossom, CITY ATTORNEY

NAME	YES	NO
HARVEY	✓	
HORN	✓	
MASIARCZYK	✓	
McFALL	✓	
OBREMSKI	✓	
RUNGE	✓	
WHEATLEY	✓	

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Group II – FHA/VA Grading Plan

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Group V – Driveway Details

The source of information used to prepare this document has been supplied by VHB Inc, Hartman and Associates Inc, Kimley-Horn Inc, PEICO Inc, and City of Deltona staff under the direction of the City of Deltona Community Development Services Department. This information has been reviewed, revised and integrated into this document after review and comments from the development community by Hartman and Associates, Inc. in their capacity as the City Engineer.

1.0 Introduction

The City of Deltona was formed as a community from many platted lots that were created by The Deltona Corporation in the 1960's and 1970's. These plats were recorded many years prior to the local and state agencies formalizing many of the regulations that are now in place. In addition, the platting did not always take into consideration the natural geographic and drainage conditions affecting each lot. Typically, there was no master drainage infrastructure or master grading plan to guide the prolific platting that occurred. As a result, applicants that wish to build homes now have to deal with the existing topographic conditions on the lot and the drainage patterns, limitation or constraints that exist in the vicinity of the lot. The Deltona Lot Grading Guidelines document attempts to provide builders with guidance in dealing with lot grading challenges and issues. Each situation will be unique and the guidelines may not be able to deal with every lot grading issue or condition. However, enough direction can be discerned from these guidelines and applied in such a way as to benefit most applicants in the community.

More contemporary subdivisions and lots that have been permitted in compliance with current governmental drainage and grading regulations should not be impacted by the conditions described above. Properly permitted and designed subdivisions will benefit from a professional design approach and will be able to be developed based on permits issued for the subdivision. Compliance with properly designed and permitted projects should result in lots that are properly graded with drainage that is directed correctly to its ultimate outfall. Obviously, these properly designed and permitted systems will require less regulatory review. Moreover, the lot grading guidelines will focus primarily on the more problematic conditions that are found in the City.

2.0 Plot Plan Submittal Procedure

2.1 Purpose and Intent

The plot plan submittal requirements ensure that proposed residential construction is consistent with the Deltona Comprehensive Plan, the Zoning Code, the Land Development Code, approved subdivision plans, public improvements plans, and with the existing improvements on and around proposed construction sites. To achieve these objectives, a residential plot plan shall be required to accompany any application for a tree removal permit, other environmental permit, any zoning permit or comments, right of way use permit, or any building permit for the following:

1. Single family residences and duplexes.
2. Accessory buildings or apartments, accessory uses and structures.
3. Private garages.
4. On-site parking areas, swimming pools, decks, or other lot improvements that are proposed, renovated or expanded.

The plan shall provide sufficient information to ensure that:

1. The location and use of the intended structure(s) is in conformance with the original subdivision plat (or replat), utilities improvement plans and existing facilities for the subdivision or unplatted area in which the lot is located.
2. Site grading, stormwater drainage, runoff, and erosion control for the lot shall at least meet current requirements for residential development during construction.
3. Necessary easements and rights of way, infrastructure plans, and comprehensive plan requirements are incorporated into the plot plan and existing facilities will not be adversely impacted.
4. Location and use of the intended structure(s) and the proposed lot grading will not adversely impact adjoining properties or create stormwater runoff impacts.

All plot plans shall be accompanied by a survey of the existing site conditions. The survey shall meet the requirements established in these guidelines and the requirements of applicable codes and ordinances.

The residential plot plan and the lot must be developed to comply with City Land Development and Zoning Code standards, and with all other applicable requirements (such as state Health Department requirements for septic tank installation). One set of criteria does not negate other criteria and the more restrictive criteria shall apply. An engineered plot plan will not be required if all applicable guidelines and codes are followed as described herin.

Note that a Right-of-Way Use Permit is required for any work on City right-of-way or property. All construction in City right-of-way and on City property shall conform to the standards and requirements of the City Engineer, City Public Works Department, City Land Development

Engineer, the FDOT "Greenbook" Standard Specifications for Construction, and applicable City Codes and Ordinances.

2.2 Information Requirements for Residential Plot Plans

The applicant for any residential construction, right of way use, or environmental permit shall submit two (2) copies of the plot plan on sheets not to exceed 24"x36". The contents of the residential plot plan shall be professionally prepared, drawn to scale and include the following:

1. Plot plan shall be based upon a signed and sealed survey. See Section 3.0 for details.
2. Address (if assigned) and Parcel ID number.
3. North arrow and bar scale.
4. Dimensions of the lot at a scale of 1"=20'. Large lots may be drawn to a smaller scale, but must include insets or supplemental plans at a scale of 1"=20' of the immediate construction limits.
5. Location and dimensions of the structure(s) proposed to be built on the lot.
6. Proposed spot grades as required by these guidelines for lots of less than 4% average grade. For lots with 4% average grade or more, proposed grading shown in one-foot contour intervals. (see **Exhibit "A"** for minimum proposed spot grade requirements). Existing and proposed spot elevations at all grade changes of proposed fill including toe and top of bank of proposed cut and fill.
7. Typical cross-sections of all proposed swales and of all significant slopes, including the continuation of such features on adjacent properties or right-of-way (exceeding 4:1).
8. Geotechnical evaluation and certified engineering design maybe required for building foundations for all lots which are suspected to contain soils with high shrink/swell potential, if identified by the City or Building Official.
9. Location of proposed drainage improvements on or adjacent to site.
10. Stormwater flows onto the property and stormwater conveyance off of the property onto adjacent property.
11. Builder will provide a roadside swale of 5" minimum depth and demonstrate how existing grades will be matched.
12. Proposed driveway cross-section. See section 8.2 for design criteria.
13. Location of service connections to water and sewer, and locations of proposed septic tank and drainfield.
14. Location and design of any waterfront improvements, including ramps and docks.
15. Location of porches, decks, swimming pools, AC pads, doorways, and other accessory structures.
16. Limits of clearing. Tree removal and replacement calculations shall be submitted with the tree removal permit application.
17. Proposed erosion and sediment control measures during construction, and proposed daily maintenance of silt fences and other erosion control measures during construction. This is required by the federal NPDES program, and immediately in the City of Deltona. If none are proposed, state so on the plan.

3.0 Survey Guidelines for Residential Lots

In the instance of a lot to be developed that is not subject to an existing approved grading plan, applicant shall submit a survey signed and sealed by Professional Surveyor and Mapper licensed in the State of Florida. This survey shall meet all requirements of Chapter 61G17-6 of the Florida Administrative Code, (Minimum Technical Standards for Florida Surveyors and Mappers), and shall include at a minimum, the following information:

1. Spot elevations at the property corners and center of the lot.
2. Spot elevations at all existing grade changes of 4% or more.
3. Additional spot elevations as warranted demonstrating the characteristics of lot topography, including an area 25' beyond the property boundary on the sides and rear.
4. Topographic data for flow-ways, depressions, swales, ditches, structures, pipes, inlets, manholes, or other existing stormwater features located within or 25' adjacent to the lot, (including the outfalls of any structures serving the lot).
5. Relic sinkholes and/or other large depressions on the site and within 50' adjacent to the site, their extent, dimensions, and depth.
6. Location of all existing improvements, or if no improvements exist, a statement to this effect should be prominently placed on the survey, (i.e. "vacant").
7. Spot elevations at the centerline of any adjacent roadway (including the existing swale flow line), extending a minimum of 50 feet in each direction from the lot, at an interval no greater than every 50 feet, and including the lowest crown of the road.
8. Show a minimum of one (1) site benchmark, (surveying for lots located in 100-year flood plain must use NGVD 1929). All elevations are required to be 1929 NGVD when a city benchmark is located within ¼ mile of the lot. A map of the city benchmarks will be provided when available from city staff and approximately 80% of the city is estimated to be within ¼ mile of an existing city benchmark.
9. Location and boundaries of the 100-year floodplain for lots that are in either a FEMA FIRM A-zone or in a depression identified by city engineering studies as having a 100-year flood elevation. The floodplain boundary shall be delineated on the plot plan. The base flood elevation, if known, shall be stated on the plot plan, and shall be the elevation determined by FEMA or approved city engineering studies. The City Engineer will determine if such an elevation is currently available.
10. Location of the Ordinary High Water Line for lots abutting surface water for purposes of determining setbacks as well as the water line as of the specific date of the survey. The City will provide OHWL information for all major water bodies.
11. Boundary and area in square feet of all on-site jurisdictional wetlands to be determined by a qualified biologist or environmental scientist.

4.0 General Lot Grading Conditions

Each lot located within the City will have existing conditions associated with it. There may be design and permitting activities that would also have an impact on the lot. A drainage hierarchy exists which will determine the extent to which an applicant will be required to gather survey, drainage and design information for a lot. Each applicant should consider this hierarchy and the implications that result from the actual field and permitted conditions for the lot. These guidelines and this hierarchy cannot cover all possible site conditions to be encountered in the City.

Each applicant must determine the condition and situation that a lot is subject to, prior to submitting a lot grading application. Generally speaking, this can be determined using the following chart:

Category	Condition of Subdivision or Lot	Resulting Design Solution
1	Master planned with approved master drainage plan and master lot & block grading plan	Show compliance with approved master plan(s).
2	Part of a permitted drainage system	Show master drainage plan and compliance with permit conditions. Grading must conform to the drainage plan.
3	Some surface drainage with outfall system; paved roadway access	Grade lots based on guidelines, with positive outfall; identify receiving waters or outfall system.
4	Paved roadway access, swale system along roadways with positive grades	Grade lots based on guidelines, factoring in condition for abutting lots and using positive lot grading; direct drainage via side lot lines and roadway swales; confirm no apparent downstream stormwater runoff impacts.
5	Paved roadway access, swale system along roadway, trapped drainage with no identified outfall (closed drainage basin, not in 100 year flood plain)	Gather additional survey information to confirm the severity of the drainage problem; locate nearest point to consider for release of drainage to a downstream system, confirm lot is not in 100-year flood plain.
6	Roadway access, swale system along roadway, trapped drainage with no identified outfall (closed drainage basin, within 100 year flood plain)	Gather additional survey information to confirm the severity of the drainage problem; locate nearest point to consider for release of drainage to a downstream system; confirm lot is in 100 year flood plain; homes proposed on lots in 100 year flood plain will not be considered for permit without additional studies as determined by the City Engineer.

Note: Any lots located in 100-year flood plain, will require special review by the City. The applicant must perform additional studies to demonstrate that a newly constructed home will not be in a flood hazard area and that it will comply with all regulatory requirements.

Lots that meet the conditions set forth in Categories 1, 2, and 3 will generally be less complicated having some positive definitions of the drainage system. Category 4 is a situation where there may not be an apparent outfall system. Additional research will be needed to confirm approval of a lot grading plan that will not create or exacerbate adjacent or downstream stormwater runoff impacts. Category 5 will require enough engineering study/design to demonstrate that approval of the lot grading plan will include an outfall from the closed drainage basin to downstream receiving waters or that stormwater runoff impacts will not occur. Category 6 will be the most difficult to process and permitting may not be feasible in order to protect the public's general safety and well being.

5.0 Lot Grading and Drainage Guidelines

5.1 Types of Lot Drainage

The engineering guidelines provide illustrations of the standard FHA types A, B, and C drainage. Type C drainage is discouraged since many of these lots trap water and exacerbate existing nuisance conditions. A Type "C" lot always requires a variance approval by the City Engineer. If Type C drainage results in a finished floor elevation that is less than one foot above the lowest crown of the adjacent street(s) then it is declared a nuisance by the City.

A "Modified Type B" drainage with gutters directing roof drainage to the front of the lot, and ultimately to the roadside swale, is the preferred method of dealing with lots that slope away from a street where a standard Type "B" lot is not practical. This type of lot drainage seeks to assure minimal impact of development on downstream adjacent lots, streams, retention areas, and lakes. It assists in preserving the capacity of the natural and man-made storm water conveyances and receptors, and provides improved flood protection for the lot. It is also consistent with implementation of NPDES Best Management Practices.

Lot grading, erosion control, and storm water management shall meet the minimum standards mandated by the State of Florida, the St. Johns River Water Management District, and the National Pollutant Discharge Elimination System within Deltona. Approved Best Management Practices shall be employed during construction. Please reference the Florida Department of Environmental Protection's Florida Development Manual, and Florida Erosion and Sediment Control Inspector's Manual. The Florida Erosion and Sediment Control Inspector's Manual is available online at http://www.dep.state.fl.us/water/stormwater/docs/erosion.htm

In order to meet these guidelines, standard Deltona Lakes subdivision lots (typically 80' wide X 120' deep) sloping from front to rear lot lines exceeding 5% shall require stemwall, pier, pile, walkout or similar construction, or shall have grading and drainage plans prepared by a Florida Licensed Professional Engineer. This requirement shall apply to all similar lots within any subdivision that does not have an approved grading and drainage plan, including lot grading, prepared by a Florida Licensed Professional Engineer, and approved as part of a subdivision plat.

5.2 General Grading Guidelines

5.2.1 Conveyance Swales (those with a positive slope to an outfall for drainage) shall be the preferred method for conveying stormwater runoff from residential lots to an appropriate outfall such as public rights-of-way or a stormwater management area. Retention swales (those that are essentially flat and do not provide drainage, they percolate runoff water) are only allowed when onsite storage of water is required. Protective swales shall be installed on all lots where the drainage flow

pattern is directed toward the proposed dwelling and should generally function as a "conveyance swale" although some "retention" may be acceptable in limited areas around the structure.

5.2.2 Minimum finished floor elevations (FFE) shall comply with following:

A. Twelve (12) inches above the established 100-year flood elevation. (As listed by FEMA in a FIRM Zone A or as determined by the City's Stormwater Master Plan.)

B. Twelve (12) inches above the lowest crown of any adjacent street, road, or right-of-way. When not feasible, a variance supported by the City Engineer is necessary.

C. Eight (8) inches above the highest finished grade adjacent to the building structure.

D. Above the seasonal high groundwater elevation.

E. The average finished grade and finished floor elevations of all adjacent developed lots, within 3 lots, or nearest developed lots if immediately adjacent lots are vacant (on each side and rear lot line). When not feasible, a variance supported by the City Engineer is necessary.

5.2.3 Special Grading Considerations

Care should be exercised when setting the FFE to consider the maximum slope of the driveway (15%), minimize cut and fill where possible and stormwater conveyance issues. Stemwall construction is recommended in areas where the required FFE would otherwise result in a code violation. Lots that have difficult grading conditions, abrupt topographic changes, significant tree preservation concerns, limited area for resolving grading conflicts, or propose to delete vital existing depressional storage are encouraged to construct stem wall foundations instead of monolithic foundations. Other grading considerations are illustrated in the exhibits that follow.

Note that gravity flow to a septic system is not one of the considerations. If the City lot grading standards cannot be met with gravity flow, then a pumped wastewater system is required. If a pumped system will not work, then a variance may be necessary.

5.3 Lots Without an Approved Master Grading Plan

5.3.1 The lot drainage exhibits are divided into three groups. Group I is for typical lots with small side setbacks. This generally is applicable to the older plats that are most prevalent in the City. Group II applies to lots that are less constrained and benefit from a larger side setback. An example might be a new subdivision that meets current design standards and regulations. Group III is the standard FHA/VA/HUD grading plan. This is shown in **Exhibit K**.

A. Individual lot grading plan will show proposed elevations at all lot corners and other significant locations as shown on **Exhibits A through F** for typical lots with small setbacks. Small setbacks are 5' to 7.5'.

5.3.2 Lots shall be graded with a minimum slope of 1% (1 ft/100 ft) in accordance with Type A, B, or C FHA/VA/HUD Grading Patterns (see **Exhibit K**). The minimum slope from the building pad to the proposed swales shall be 1% (1 ft/100 ft). The maximum yard slope is 10 % to a distance of 10 feet from the front of the building and 20 feet from the rear of the building. This yard slope maximum is a goal that may be unattainable due to severe terrain conditions. All relevant code criteria shall be used to evaluate and ensure compliance of yard slopes that do not meet the 10% percent maximum goal.

5.3.3 For lots that propose the use of alternative grading methods such as retaining walls, design plans and calculations are required.

5.3.4 Swales shall be constructed using the following guidelines:

A. The preferred side slopes should be at least 4:1 (horizontal: vertical), however under no circumstances steeper than 3:1 and only with City approval.

B. Minimum desired (when feasible) depth of 1 foot measured from the swale bottom to the minimum top of bank elevation. Retention swales deeper than 2.0' will be considered under the criteria for retention pond design.

C. Minimum longitudinal slope of 1% (1 ft/100 ft).

D. Maximum longitudinal slope based on maximum flow velocity of 5 fps.

E. Minimum (when feasible) berm width of 1 foot shall be provided.

F. Transition slope to existing grade no steeper than 4:1.

G. Sod all swales from top of slope to top of slope. Maintain and water sod until root system is established.

H. When possible, the lot line will be the centerline of the protective side lot drainage swales.

5.3.5 In general, lots shall be graded so they drain to an approved stormwater management area or public right-of-way with a positive outfall. If conditions exist that preclude the builder from providing a positive outfall for the lot, then stormwater management shall be provided on the lot. The lot shall then be graded so that it drains to the on-site stormwater facility. The on-site stormwater management shall meet the following guidelines:

A. A stormwater management facility shall be normally dry with a minimum clearance of two (2) feet between the bottom and the estimated seasonal high groundwater table.

B. Slopes shall be no steeper than 3:1 (horizontal: vertical) if less than 2 feet deep. Facilities deeper than 2 feet will be considered retention ponds and will have to comply with FAC 62-25 and FAC 40C with a 4:1 side slope.

C. Minimum retention pond bottom width shall be four (4) feet. Retention swales may have a "V" section when space is limited. However, 1' min. bottom is preferred.

D. The volume required shall be based upon the mean annual/24 hour storm event (4.57") and the surface area of the proposed home (square footage under the eaves). The volume required V = (4.57")(sf roof area)(1/12). The facility shall be sized to retain this entire volume. As an alternative,

the applicant may have a Professional Engineer registered in the State of Florida size the facility based upon the pre/post attenuation of the 25 year / 24 hour storm event for the entire lot.

E. An easement shall be placed over on-site retention ponds with the requirement that the homeowner shall maintain the pond in perpetuity unless they are fully contained within existing platted drainage easements.

5.3.6 If the above requirements cannot be met, alternative design should be considered. This includes use of geosynthetics, slope stabilization, and retaining walls. Geosynthetics and slope stabilization shall be designed, signed and sealed by an engineer registered in the State of Florida. Swales shall be provided along the building side of the retaining wall to collect and convey stormwater runoff to public rights-of-way without discharging to adjacent lots. The swales shall meet the guidelines set forth in the section 5.3.5.

5.3.7 If the builder cannot comply with paragraphs above, and demonstrates there is a hardship condition, the City will review alternative grading designs and approaches by the builder prepared by an engineer registered in the State of Florida.

5.4 Lots With an Approved Master Grading Plan

5.4.1 The Proposed Lot Grading Plan shall be submitted for review. The builder shall propose lot grading and a finished floor elevation consistent with the approved Master Lot Grading Plan.

5.4.2 If lot grading is proposed that is not consistent with the approved Master Lot Grading Plan, a revised lot-grading plan shall be submitted for review that is signed and sealed by an engineer registered in the State of Florida. See Section above for submittal requirements for a lot without a Master Grading Plan.

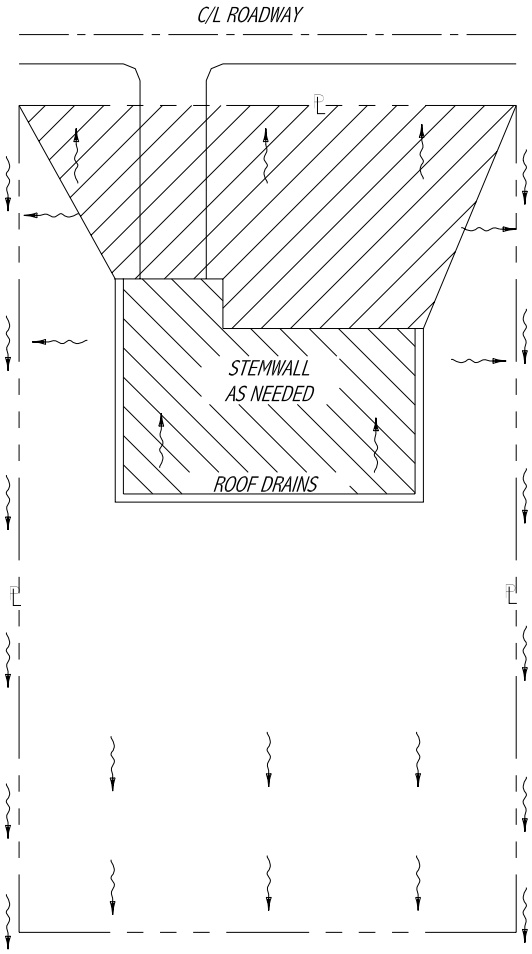
5.5 Modified Type "B" Lot Drainage

Type "C" grading requires a variance application and review by the City Engineer in accordance with City Code 96-27(I). The Code describes lots that are less than 1-foot above the lowest crown of the adjacent road as "nuisance" lots. This is found under the Declaration of Nuisance, Section 96-27(D)(4). In addition, it is the City's policy to have all residential structures at least 1-foot above the crown of the street where technically possible. The applications currently submitted for review occasionally grade away from the roadway and the technical merits of allowing the finished floor to be below the crown of the road must be evaluated.

There are significant drainage problems throughout the City associated with the lack of existing tertiary infrastructure around existing houses built prior to incorporation (essentially rear lot swales and easements) as well as certain deficiencies in the secondary infrastructure (roadside swales and drainage retention areas). As a result, Type "C" graded lots have been found to exacerbate existing drainage problems when not managed during the site grading development of the projects.

As a result, the City has discussed various ways to allow grading that works with the natural lay of the land and protects public safety, health and welfare. These previously "C" graded lots should use a modified "B" lot grading instead, where technically feasible. By doing so, the majority of the impervious surfaces created by the lot construction can be directed into the public right-of-way and ultimately conveyed to City owned and operated facilities for proper stormwater management. The remaining portion of the lot is allowed to drain away from the public right-of-ways since those areas remain undeveloped (non-impervious cover) and thus should not exacerbate or cause downstream stormwater runoff impacts.

The modified "B" grading shall have at least the impervious roof area of the house, driveway and immediate front yard brought forward to the public right-of-way. The side yard swales that are already directed away from the roadway can be maintained without altering existing and adjacent property. The grading transitions by forming a wedge from the foundation of the home to the corners of the lot. Thus, most of the side yard and backyard would drain to the back like a typical Type "C" lot. In order to ensure that the entire impervious portion of the house drains to the front, roof drains are required over the entire house, manifolded to collection pipes that drain forward with positive outfall to the public right-of-way. It is likely that stem wall construction will be necessary in most situations.



MODIFIED "B"

BRINGS MOST IMPERVIOUS SURFACES FORWARD

09/16/03

6.0 Roof Gutter Guidelines

Roof gutters will be required for single family homes under the following conditions:

1. When ground slopes within 5 feet of outside of wall and is steeper than 4:1.
2. When existing drainage conditions are constrained and there is potential for stormwater runoff impacts in certain lot areas. In this instance, drainage from gutters will direct water to a positive drainage system which will convey stormwater off-site to an area not susceptible to stormwater runoff impacts.
3. All multi-story residences, on upper levels.
4. On all Modified Type "B" lots.
5. Note that the DOH (Department of Health) requires that downspouts not be directed toward a septic drainfield.

7.0 Retaining Wall Requirements

7.1 All retaining walls over 2' in height shall be designed, signed and sealed by an engineer registered in the State of Florida. Retaining walls used for proposed lots shall be designed, signed and sealed by an engineer registered in the State of Florida, unless it meets the latest guidelines set forth in one of the following:

7.1.1 Standard Cantilever retaining wall from concrete block on footer as given in the latest edition of the Concrete Masonry Handbook for Architects, Engineers, and Builders. Retaining walls shall be of a long-lasting articulated block, concrete, stone, unless otherwise approved by the City Engineer.

7.1.2 Index 520 of the latest *FDOT Roadway and Traffic Design Standards.*

7.1.3 Indices 800 through 822 of the FDOT Standard Drawings from the Structures Design Office.

7.2 Conditions requiring a retaining wall shall include but are not limited to the following:

7.2.1 A retaining wall is required instead of a site layout requiring slopes greater than maximum allowable based on runoff flow velocities.

7.2.2 A retaining wall is required instead of a site layout requiring slopes greater than maximum allowable based on soil stability. Soil stability shall be verified by a Florida registered, professional Engineer for transition slopes that would be steeper than 3:1 (horizontal: vertical) for depths up to 2 feet and transition slopes that would be steeper than 4:1 for depths greater than 2 feet (horizontal: vertical). See **Exhibits C, E, and F**.

7.3 Retaining walls greater than thirty inches (30") in height, along a property line shall have a fence or safety rail as part of the design. See FBC section 1015.1

7.4 If height of retaining wall is greater than 18" then appropriate construction materials shall include pre-cast concrete, cast-in-place concrete, and concrete masonry units (CMU). Other materials may be used in keeping with the architecture of the house and neighborhood with approval by the City Building Department.

7.5 See **Exhibit M**, for examples of retaining wall structures. Other retaining wall systems will be considered by the City Engineer for approval if their structural stability can be demonstrated.

7.6 Definition of a Retaining Wall: Retaining walls are structural in nature and their primary purpose is to hold back earth that would otherwise be unstable and prone to failure. There maybe a significant risk to public health, safety and welfare if a retaining wall is improperly constructed.

7.7 Definition of a Landscape Planter: A landscape planter is decorative in nature and its primary purpose is to elevate a small amount of earth for a landscape planting bed. An elevated bed for a home vegetable garden (non-commercial) or a "tree well" is considered

a Landscape Planter. It is conceivable that a large enough Landscape Planter would have a structure element and be considered a retaining wall, and to prevent such cases, size thresholds will be enforced. Any raised bed of earth consisting of imported fill and less than 2 feet deep at the largest depth with no structures constructed on the raised bed shall be considered a Landscape Planter. The maximum slope allowed bearing pressure on top of this 2-foot maximum planter wall shall be 5:1 (20%). Fills above that slope will be considered a retaining wall.

8.0 Driveway Design Guidelines

8.1 Introduction

The current driveway standards for the City of Deltona were adopted from Volusia County's land development code. However, Volusia County is relatively flat in regards to varying elevations, whereas the City of Deltona has significant elevation changes within its jurisdiction. Therefore, the adopted land development code from Volusia County does not adequately address issues related to driveway elevation changes.

Some of the more critical issues pertaining to driveway elevation changes are:

- Maximum and minimum grades for driveways,
- Transitional grades for driveways and between a driveway and an adjacent roadway,
- Driveway integration with existing and/or proposed sidewalks,
- Driveway integration with existing and/or proposed underground utilities, and
- Driveway integration with existing roadside swales.

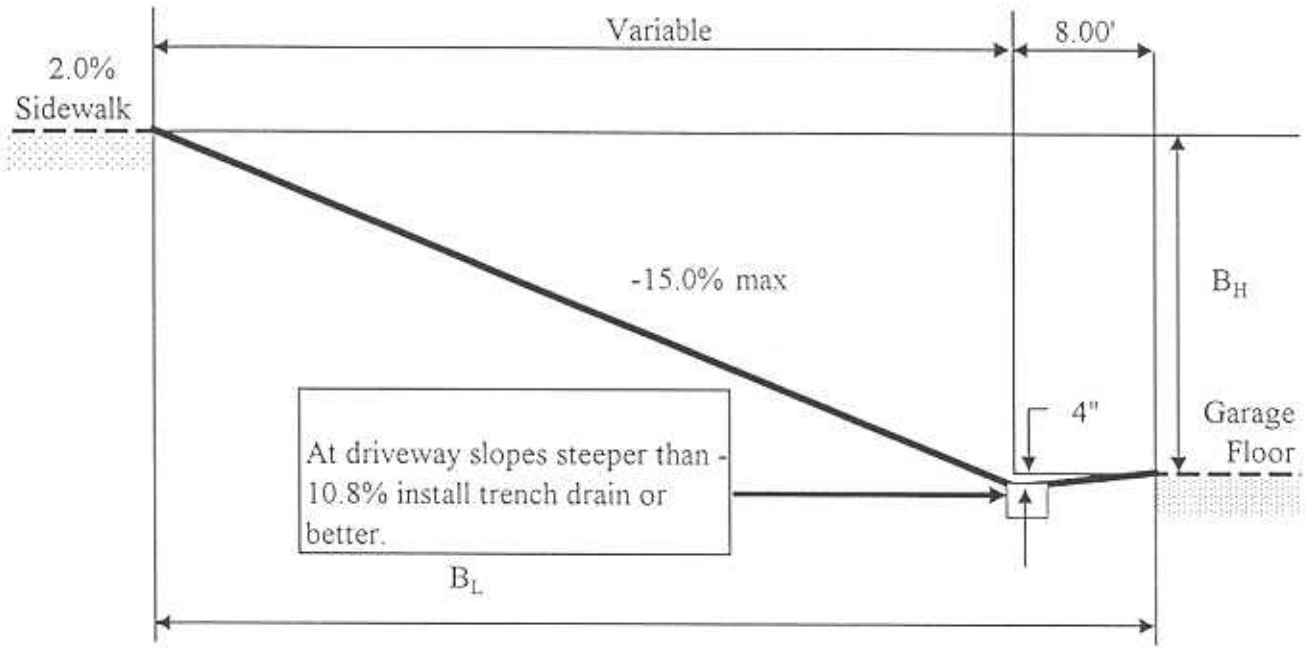
8.2 Maximum and Minimum Driveway Grades

The maximum grade for a residential driveway should be fifteen (15) percent. Driveways which exceed this must be designed by a licensed civil engineer registered in the State of Florida. Residential driveways should retain a minimum profile grade of 0.3 percent.

A grade transition will be required when a driveway has a difference between adjoining grades that is greater than fourteen (14) percent. Table 1 is provided to illustrate maximum slopes of driveways when the garage is at or below the sidewalk. Residential developments that have a difference in elevation between the ROW and the finished floor such that the fifteen (15) percent slope would be exceeded must be designed by a licensed civil engineer registered in the State of Florida. *Table 1* is not intended to be used for the design and construction of commercial developments. All commercial developments should be designed by a licensed civil engineer.

Table 1 - SFR Driveway

USE THIS WHEN GARAGE IS AT OR BELOW SIDEWALK



B_H = The height the garage floor is below the driveway centerline at the lot line. The driveway must dip below garage floor.

B_L = The horizontal distance, measured along the driveway centerline, from lot line to garage threshold.

Interpolate between values.

Enter table with driveway length (B_L), and read maximum allowable elevation drop (B_H)

Enter table with elevation difference (B_H), and read minimum required driveway length (B_L).

B_H (Feet)	B_L (Feet)
0.33	8
-0.42	13
-0.72	15
-1.47	**20**
-1.62	21
-1.77	22
-1.92	23
-2.07	24
-2.22	**25**
-2.37	26
-2.52	27
-2.67	28
-2.82	29
-2.97	30
-3.72	**35**
-4.47	40
-5.22	45
-5.97	50

8.2.1 Driveway ADA Requirements (as required by Florida Building Code):

If access to the residential structure requires handicap access the driveway be constructed at 20:1 (5%) slope or flatter. If driveway slope is steeper than 20:1 (5%) slope a sidewalk must be provided to allow access to the house per Chapter 4.3 of the Florida Accessibility Code for Building Construction.

8.3 Maximum and Minimum Driveway Widths

Residential driveways should conform to the following minimum and maximum driveway widths and curb cuts within the right of way. These standards have been illustrated in **Exhibit O**.

	Minimum Driveway Width	**Minimum Curb Cut**	**Maximum Driveway Width**	**Maximum Curb Cut**
Single Driveway	12 ft.	20 ft.	14 ft.	24 ft.
Double Driveway	16 ft.	24 ft.	24 ft.	34 ft.

The width of all curb cuts shall include a transitional flair that is four (4) feet wide on each side of the driveway as illustrated in **Exhibit O**.

8.4 Minimum Sight Distances/Taper

Residential driveways should have at minimum a triangular area on either side of the driveway formed by two (2) lines ten (10) feet in length extending from the intersection of the driveway and the edge of pavement and a third side which connects the ends of the other two sides. **Exhibit O** illustrates the minimum sight distance/taper for a driveway. This area should be free from visual obstruction. Tree canopies within the sight triangle should be at least ten feet above the highest point on the adjacent roadway directly in front of the driveway.

8.5 Integration of Driveways with Existing and Proposed Sidewalks

If no sidewalk exists or has been designed at the time of construction of the driveway, then the driveway should be constructed in such a manner that is conducive to future construction of a sidewalk. Existing driveways that must be modified to accommodate the construction of a sidewalk must meet the current driveway standards for the City of Deltona. Moreover, they should not have a grade of more than fifteen (15) percent and they must adhere to the minimum transition lengths if the grade difference is greater than

fourteen (14) percent. The only exception is for driveways that connect to state roadway, which must meet FDOT driveway standards.

8.6 Integration of Driveways with Existing Roadside Swales

Driveways should provide for existing roadside swales. The location and depth of the swale geometry will vary on a case-by-case basis. Ideally, the vertex of the swale should be located at the midpoint between the edge of pavement and the sidewalk, which is calculated as follows:

- Midpoint = (x-5)/2,

  Where:

  X is the distance from the edge of the pavement or curb to the ROW line.
  Five (5) is the sum of the width of the sidewalk (typically four (4) feet) and the distance by which it is offset from the ROW line (typically one (1) foot).

It should be noted that the equation given above is for a typical driveway; however, depending on the width of the ROW, the location of an existing or proposed sidewalk, or the location of the existing swale will affect this equation. It should also be noted that the required transition length between adjoining grades at the ROW line might require a length of constant slope that is greater than the sum of width of the sidewalk and the distance by which it is offset from the ROW line.

8.7 Driveway Construction Materials

Residential driveways should be constructed of concrete (Portland cement) having a minimum thickness of six (6) inches within the right of way and a minimum strength of 2500 psi or 1" Asphalt Type S-1. Sub-base shall be minimum thickness of six (6) inches and compacted at 95% minimum density. As an alternate under approval of the City Engineer, the use of mulch or gravel may be used if the driveway has a slope less than three (3) percent (outside of right-of-way). Sub-base shall be minimum thickness of six (6) inches and compacted at 95% minimum density. See **Exhibit Q** for driveway material details.

8.8 Access Standards Based on Roadway Classification

All parcels shall be allowed one access point, consisting of one two-way driveway or a pair of one-way driveways, except for those properties restricted by subdivision plats. The minimum frontage to allow two access points shall be as follows:

Driveway Classification	Arterial	Major Collector	Minor Collector	Local
Residential	N/A	200’	200’	150’

Note: Parcel with two access points must be placed at a minimum distance of 5 feet from each property line and outside of the plotted easement, with both access points having a minimum separation of 30 feet from the inside edge of pavement from each driveway. See the Land Development Code for additional requirements such as the distance required from an intersection.

9.0 Compensating Storage Policy

The City established a policy to address the compensating storage requirements for existing platted single family lots in the city. Compensating storage is not directly addressed in the Land Development Code (LDC), however it is necessary in some circumstances for the protection of public health, safety and welfare. Note that the LDC requirement to set the FFE one foot above the 100 year / 24 hour flood elevations still applies and shall be based upon the approved Stormwater Master Plan (SMP) flood elevations, as the best available information. Please note that the applicant must have an engineer determine the 100 year / 24 hour flood elevation in depressional areas not studied by FEMA or established in the approved SMP.

The City of Deltona contains many existing platted lots which are located within the FEMA floodplain. There are an even greater number of existing platted lots that are considered within the SMP floodplain (as determined through analysis in the approved stormwater master plan for the city). The floodplain elevations and extents as defined in the SMP will be used as the basis of this policy until which time there is more refined data available. GIS maps have been developed to identify lots within this floodplain. Please note that there are several floodways identified on these maps, which are to be treated differently than floodplains.

There are three (3) distinct scenarios for a single family lot within the City of Deltona:

1. The lot is within a floodway (non-recognized by FEMA, but actually observed).
2. The lot is within a floodplain which borders a large partially landlocked waterbody.
3. The lot is within a floodplain which borders a small landlocked depressional area.

In each case, the appropriate action is as follows:

1. No net fill is allowed within a floodway. The effects of the loss of floodway capacity are not easily quantified and are of risk to the all the lots bordering the floodway and upstream floodplains. A No Rise Certification, signed and sealed by a Registered Professional Engineer, shall be required.

2. An existing platted lot which directly borders any of the following listed water bodies will not be required to provide compensating storage since they all are either unlocked or will be as part of the Theresa Watershed Emergency Authorization Project. Lots located on any other water body shall be reviewed by the City Engineer to determine if compensating storage is required.

    A. Sixma Lake
    B. Dupont Lake
    C. Trout Lake
    D. Angela Lake
    E. Gleason Lake
    F. McGarity Lake

G. Theresa Lake
H. Louise Lake
I. Sidney Lake
J. Big Lake
K. Butler Chain of Lakes

3. A lot located within a local depressional area will be required to provide compensating storage. If the applicant wishes to challenge this requirement, the City Engineer may review calculations provided by an engineer registered in the State of Florida to practice such calculations to determine if compensating storage is required on a case by case basis.

Group I - Lot Grading for Typical Lots with Small Side Setbacks

Exhibit A Spot Grading Pattern for Lot Grading Approval

Exhibit B Schematic for Group I Grading Requirements (When Lots have tight side setbacks)

Exhibit C-1 Lot Grading on a Hump (No Gradient) When Adjacent lots are Lower and Developed

Exhibit C-2 Lot Grading on a Sump (No Gradient) When Adjacent lots are Higher and Developed

Exhibit C-3 Lot Grading on a Gradient When Adjacent lots are Slightly Higher and Lower

Exhibit D-1 Lot Grading on a Gradient When an Adjacent Lot is Extremely Lower

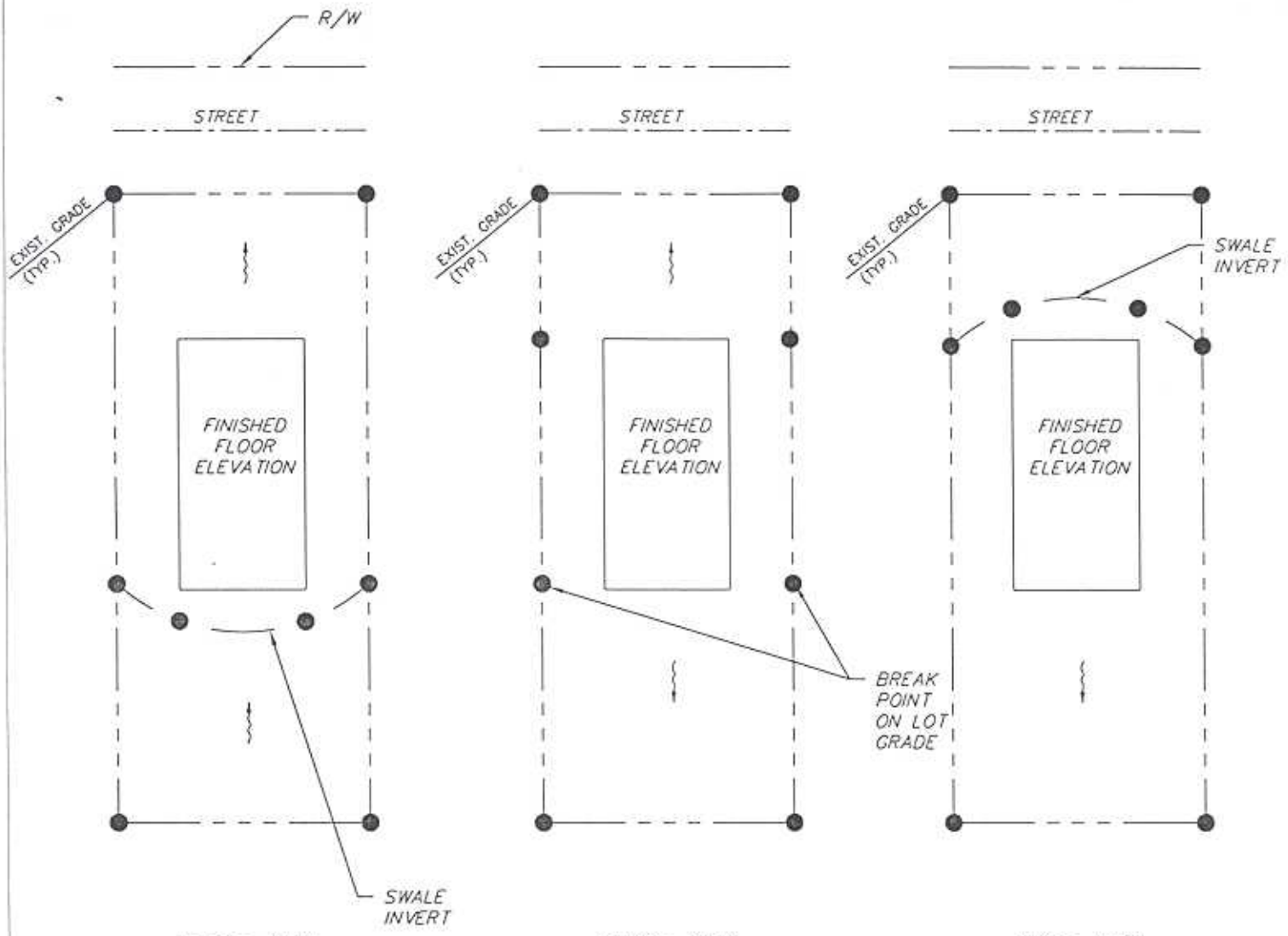
Exhibit D-2 Lot Grading on a Gradient When an Adjacent Lot is Extremely Lower and House Can Be Moved Away From Building Setback

Exhibit E-1 Lot Grading on a Gradient When Adjacent Lots are Significantly Higher or Lower and House Can Be Located Away From Low Side Building Setback Line

Exhibit E-2 Lot Grading When Adjacent Lots are Significantly Higher or Lower and House Can Be Located Away From Low Side Building Setback Line

Exhibit F-1 Lot Grading on a Gradient When Adjacent Lots are Significantly Higher and Lower and Adjacent Lots Will Not Allow Construction Within Their Easement

Exhibit F-2 Lot Grading on a Gradient When Adjacent Lots are Significantly Higher or Lower and Adjacent Lots Will Not Allow Construction Within Their Easement



TYPE "A" LOT GRADING

TYPE "B" LOT GRADING

TYPE "C" LOT GRADING

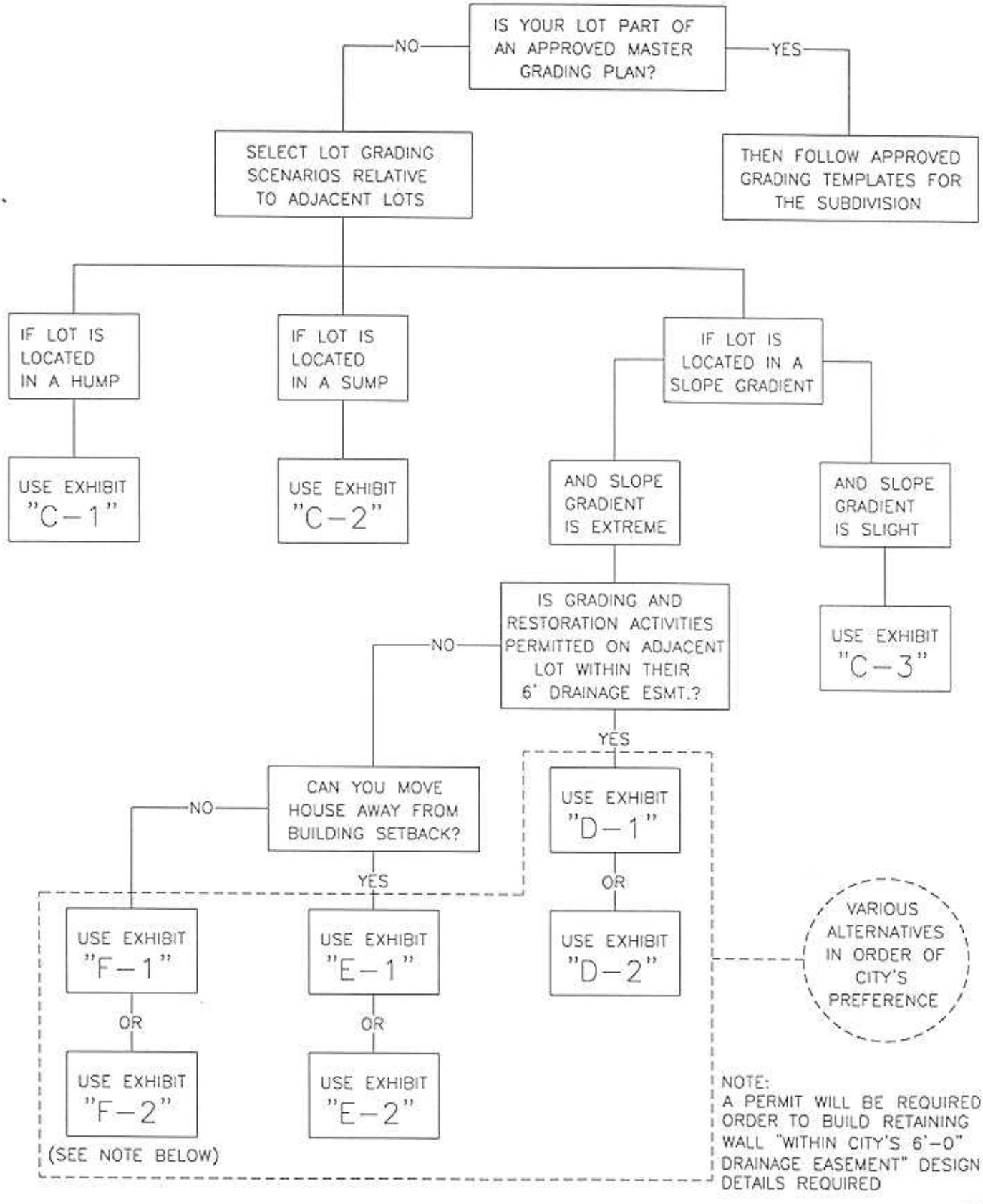
MINIMUM PROVIDED SPOT GRADES FOR TYPICAL LOT GRADING PATTERNS

City of Deltona

EXHIBIT "A"

K:\Ken Zogers\Residential Guideline\Lot Grading Exhibits\EXHIBIT A.DWG

Plotted: Sep 16, 2003 - 10:14am by kzogers



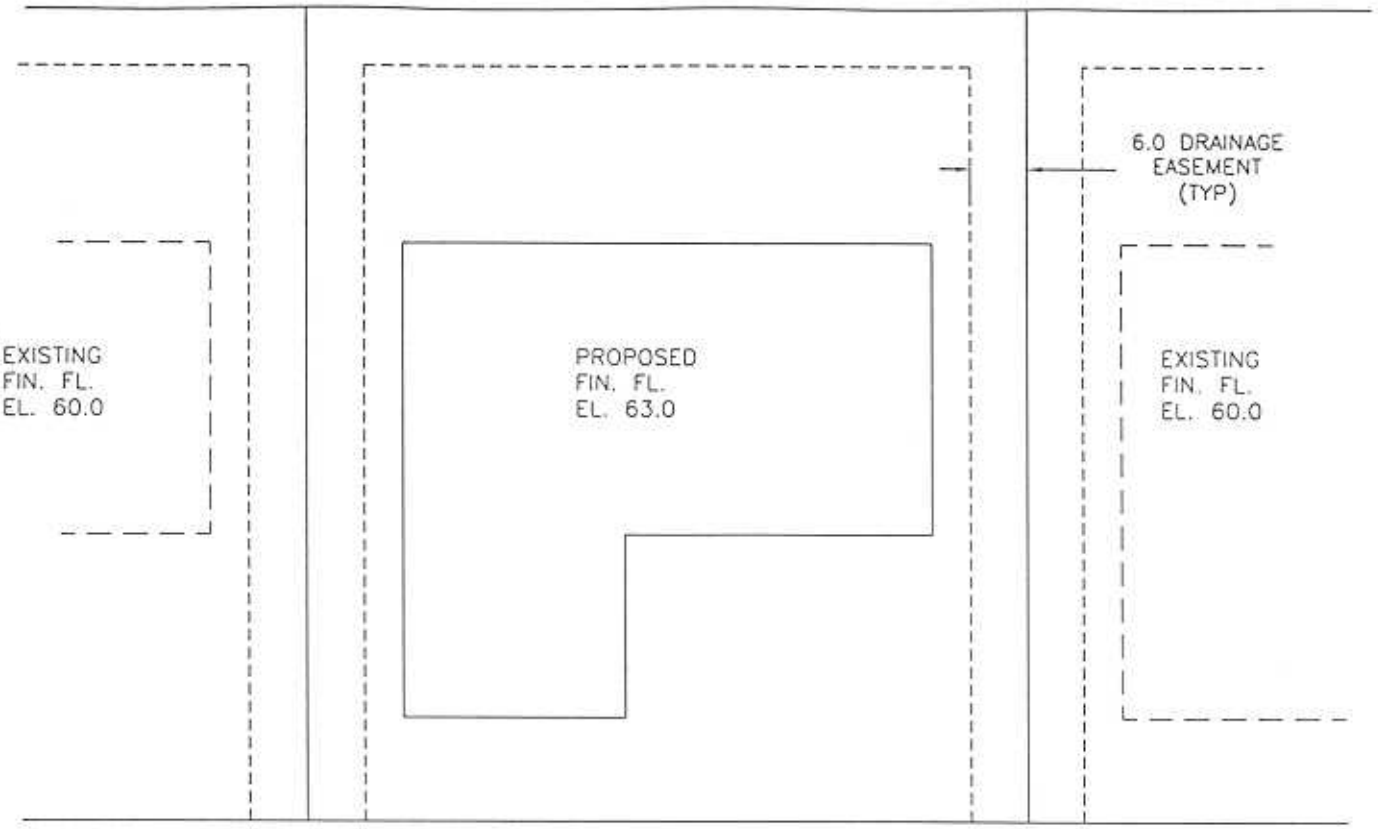
SCHEMATIC FOR GROUP I GRADING REQUIREMENTS
(WHEN LOTS HAVE TIGHT SIDE SETBACKS)

City of Deltona

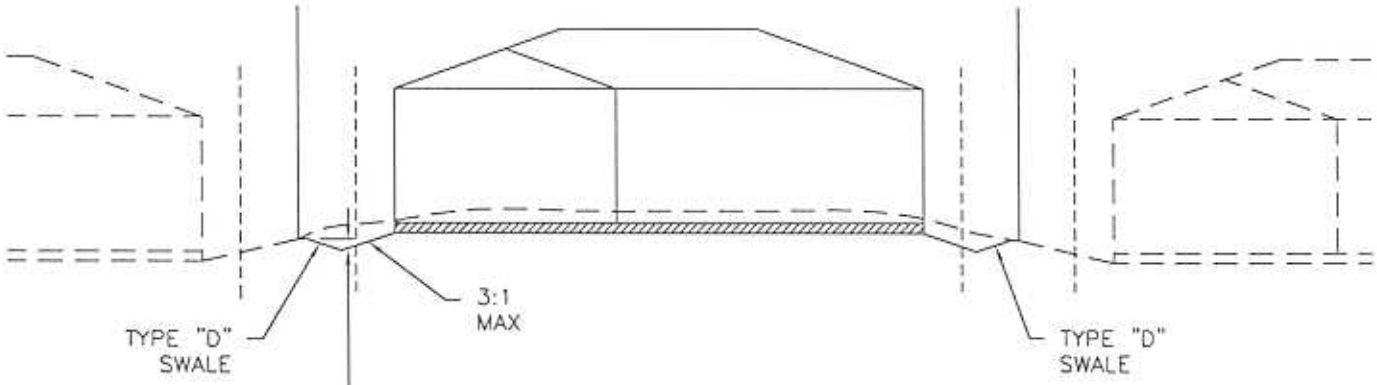
EXHIBIT "B"

K:\Ken Zagers\Residential Guideline\Lot Grading Exhibits\EXHIBIT B.DWG

Plotted: Aug 29, 2003 - 11:24am by kzagers



PLAN



SECTION

*WHEN FEASIBLE

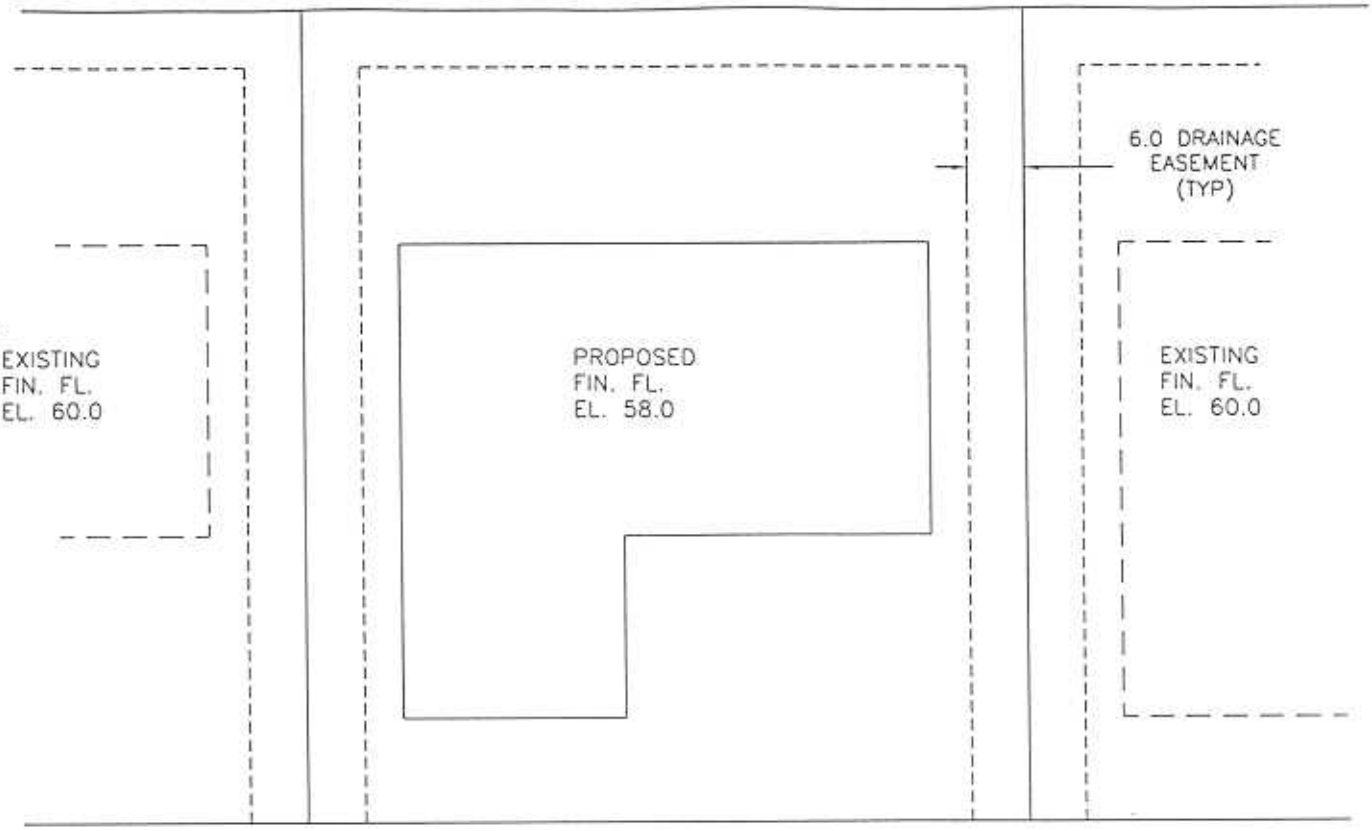
LOT GRADING ON A HUMP (NO GRADIENT) WHEN ADJACENT LOTS ARE LOWER & DEVELOPED

NOTES:
1. THE PROPOSED FIN. FLR. ELEVATION CAN BE HIGHER THAN THE EXISTING NEIGHBORS ONLY WHEN IN A LOCALIZED "HUMP" CONDITION AS SHOWN.
2. THE ELEVATIONS SHOWN ABOVE ARE FOR ILLUSTRATIVE PURPOSES ONLY.
3. IF EXISTING STRUCTURES DO NOT PROHIBIT USE OF EASEMENT CENTERED ON PROPERTY LINE THEN USE TYPE "A" SWALE (WITH PROPERTY OWNER'S PERMISSION).

City of Deltona

EXHIBIT "C-1"

K:\Ken Zogers\Residential Guideline\Lot Grading Exhibits\EXHIBIT C-1.DWG
Plotted: Aug 29, 2003 - 12:58pm by kzogers



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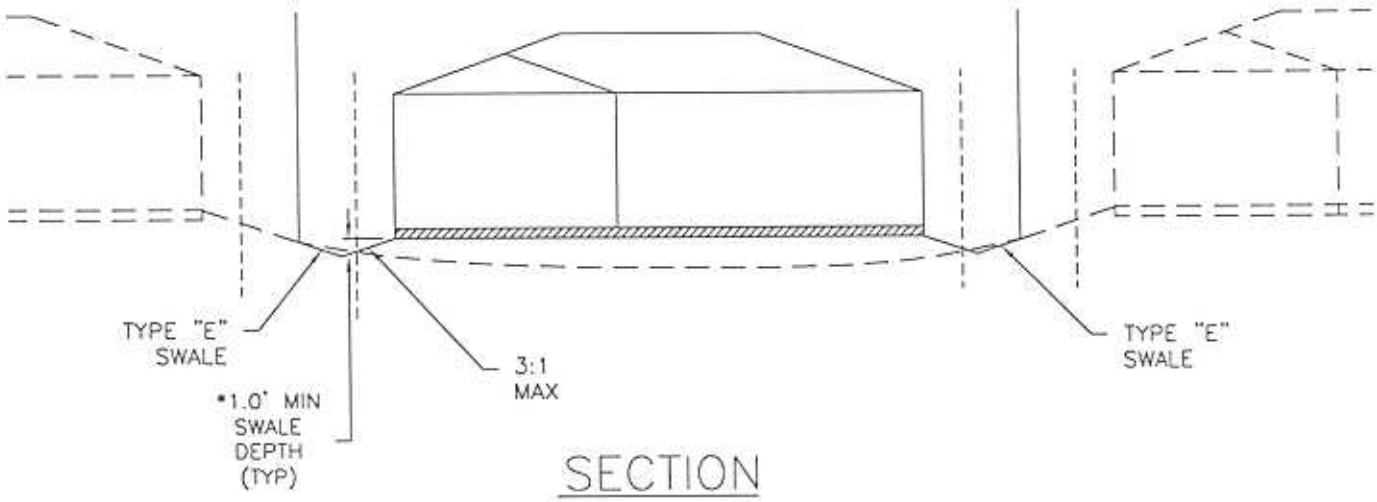


SECTION

*WHEN FEASIBLE

LOT GRADING ON A "SUMP" (NO GRADIENT)
WHEN ADJACENT LOTS ARE HIGHER &
DEVELOPED

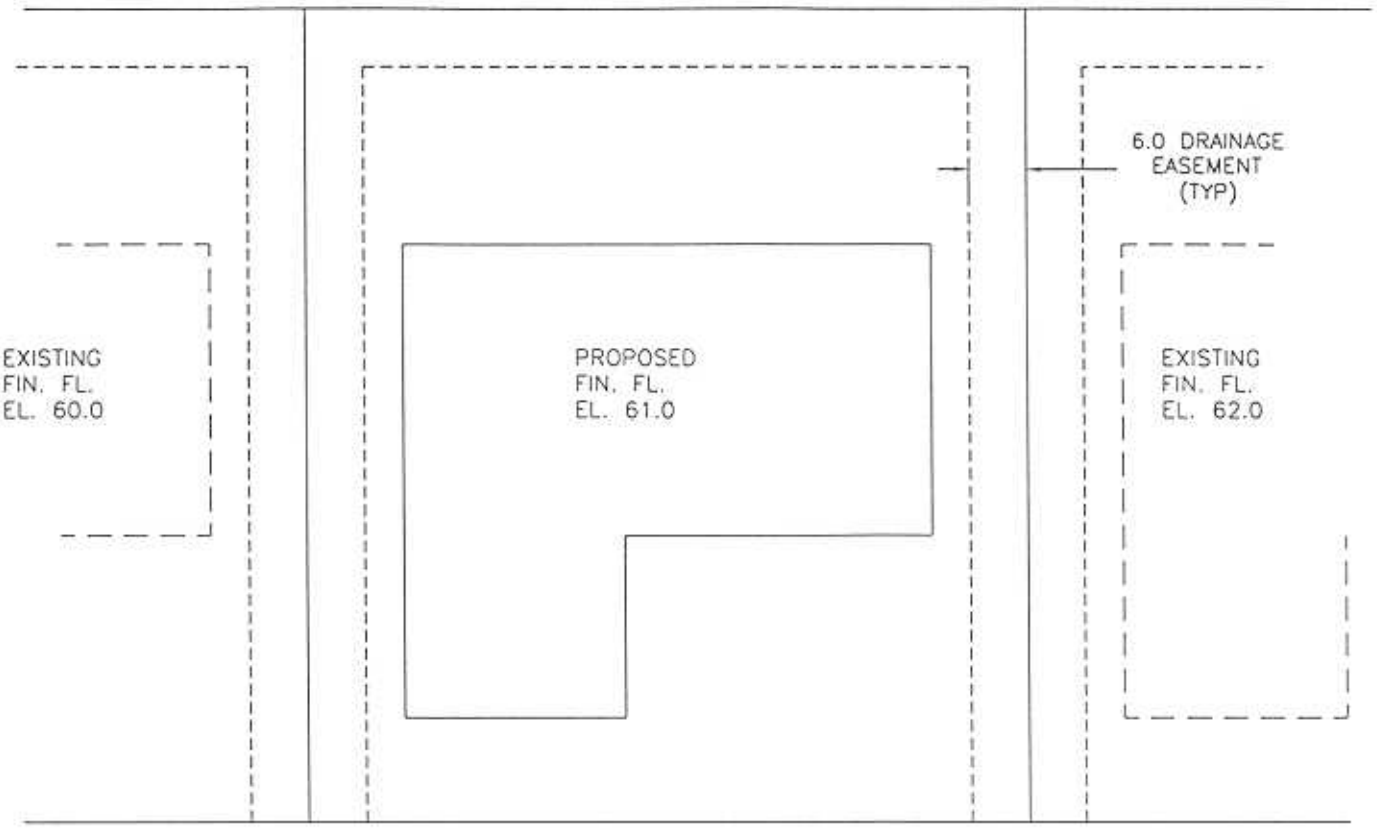
NOTES:
1. THE PROPOSED FIN. FLR. ELEVATION CAN BE LOWER THAN THE EXISTING NEIGHBORS ONLY WHEN IN A LOCALIZED "SUMP" CONDITION AS SHOWN.
2. THE ELEVATIONS SHOWN ABOVE ARE FOR ILLUSTRATIVE PURPOSES ONLY.
3. IF EXISTING STRUCTURES DO NOT PROHIBIT USE OF EASEMENT CENTERED ON PROPERTY LINE THEN USE TYPE "A" SWALE (WITH PROPERTY OWNER'S PERMISSION).

City of Deltona

EXHIBIT "C-2"

K:\Ken Zagers\Residential Guideline\Lot Grading Exhibits\EXHIBIT C-2.DWG

Plotted: Aug 29, 2003 - 1:01pm by kzagers



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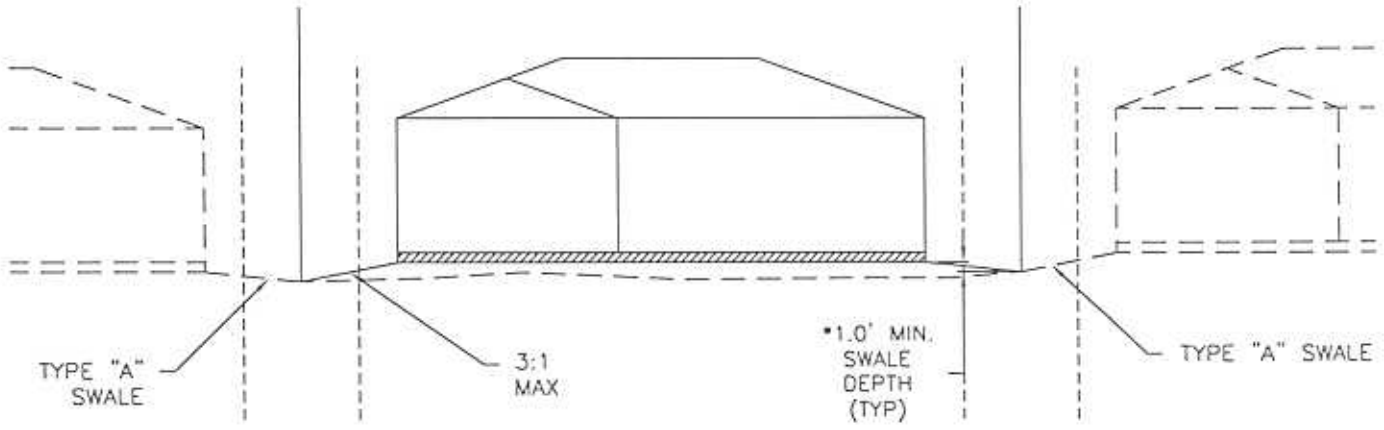


SECTION

*WHEN FEASIBLE

LOT GRADING ON A GRADIENT WHEN ADJACENT LOTS ARE SLIGHTLY HIGHER AND LOWER

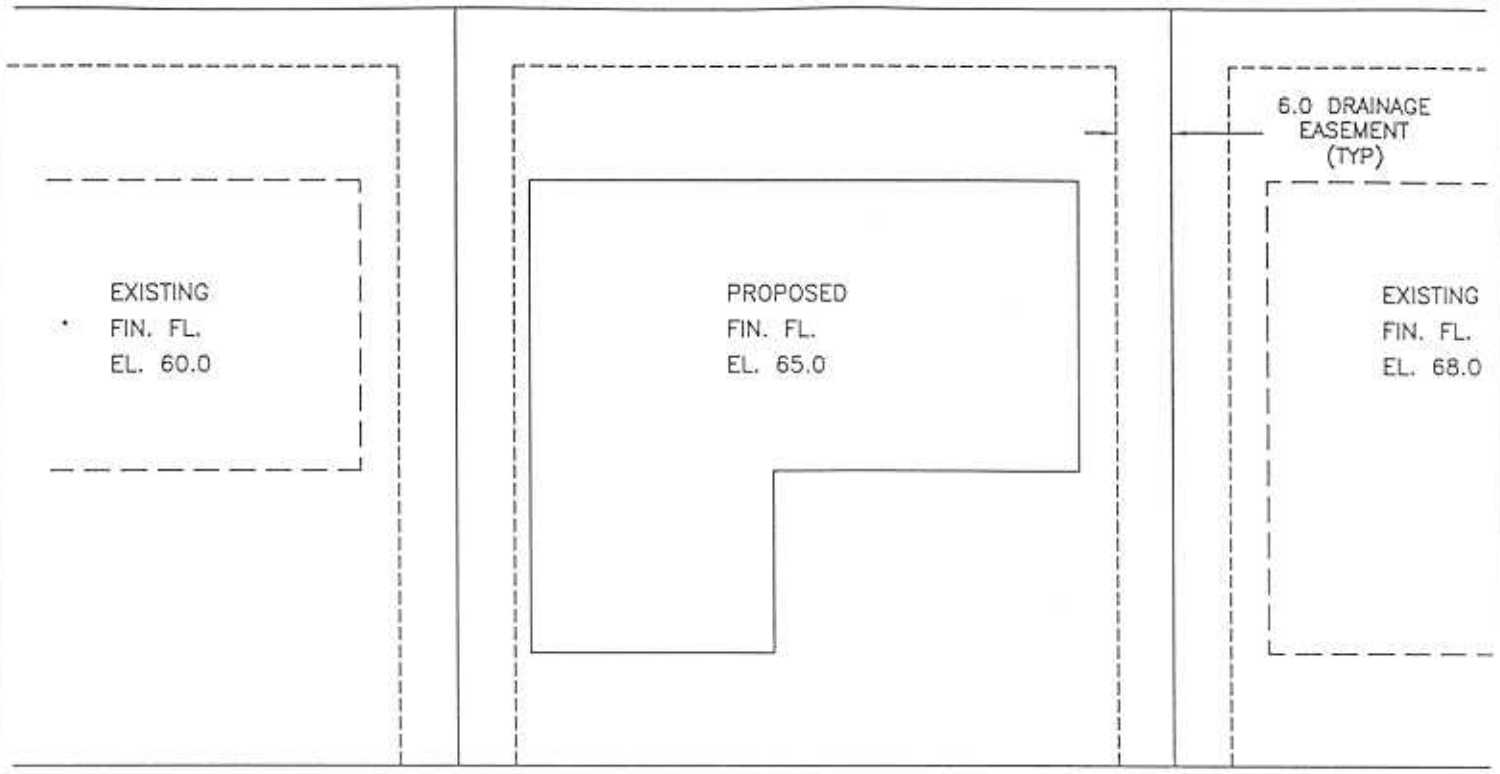
NOTES:
1. THE PROPOSED FIN. FLR. WAS APPROVED AT AN ELEVATION BETWEEN THE TWO EXISTING ELEVATIONS. IT CAN NOT BE HIGHER OR LOWER THAN ALL OF THE EXISTING NEIGHBORS.
2. THE ELEVATIONS SHOWN ABOVE ARE FOR ILLUSTRATIVE PURPOSES ONLY.

City of Deltona

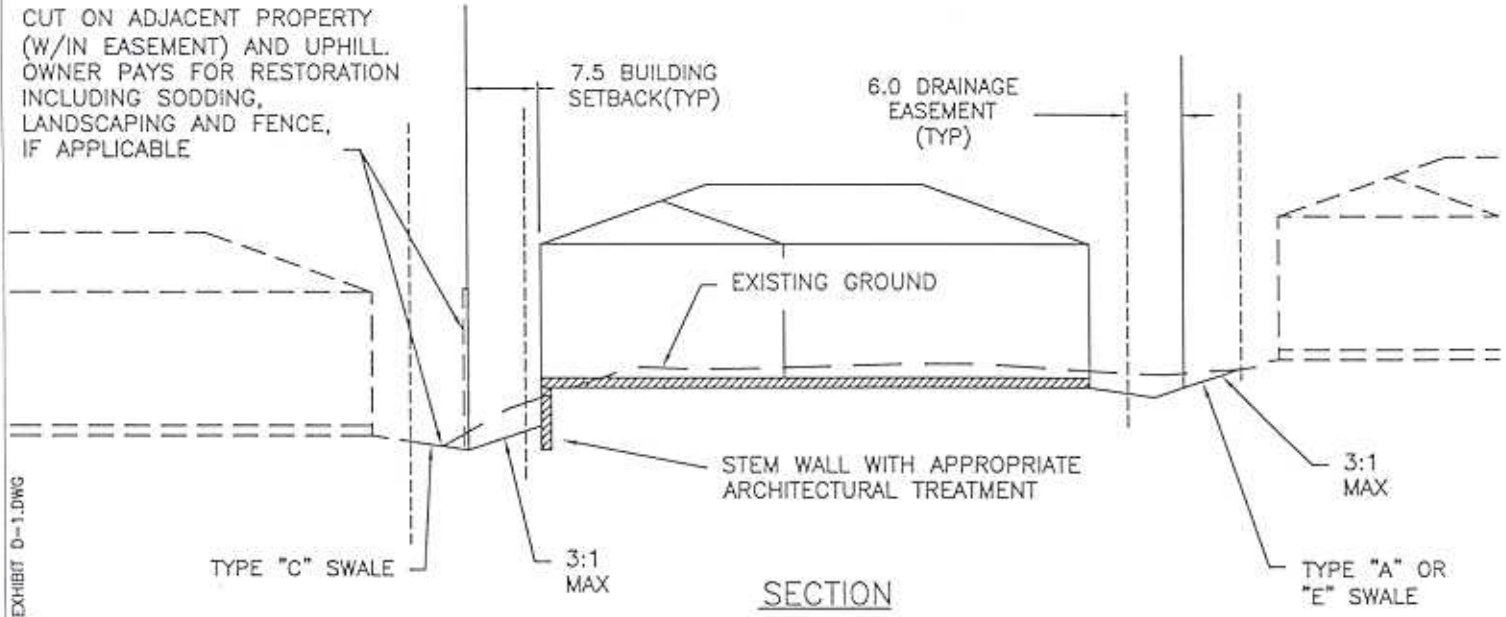
EXHIBIT "C-3"

K:\Ken Zogers\Residential Guideline\Lot Grading Exhibits\EXHIBIT C-3.DWG

Plotted: Aug 29, 2003 - 1:03pm by kzogers



RIGHT-OF-WAY
PLAN



SECTION

LOT GRADING ON A GRADIENT WHEN AN ADJACENT LOT IS EXTREMELY LOWER

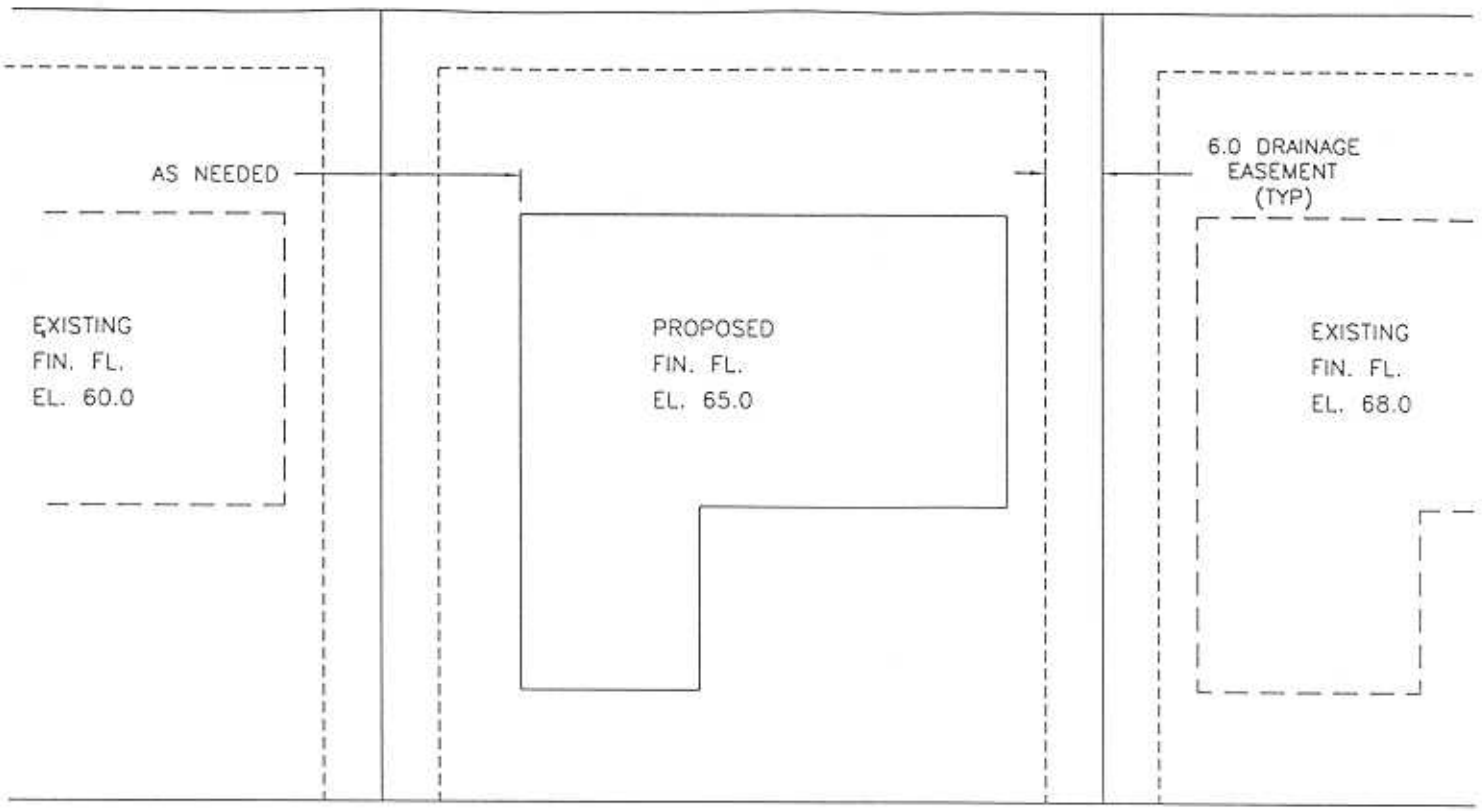
NOTES:

1. THE PROPOSED FIN. FLR. WAS APPROVED AT AN ELEVATION BETWEEN THE TWO EXISTING ELEVATIONS. IT CAN NOT BE HIGHER OR LOWER THAN ALL OF THE EXISTING NEIGHBORS.
2. THE ELEVATIONS SHOWN ABOVE ARE FOR ILLUSTRATIVE PURPOSES ONLY.
3. TECHNICALLY, THE CODE REQUIRES A PROPOSED F.F. EL. OF 64 AND CUT FOR THE HOUSE TO BE MINIMIZED WHICH CAUSES A CONFLICT. THIS TECHNIQUE, THEREFORE, GRANTS A PRE-APPROVED VARIANCE SINCE IT STRIVES TO MEET THE OVERALL INTENT OF BOTH PROVISIONS.

City of Deltona

EXHIBIT "D-1"

K:\Ken Zagers\Residential Guideline\Lot Grading Exhibits\EXHIBIT D-1.DWG
Plotted: Jul 29, 2003 - 2:41pm by kzagers



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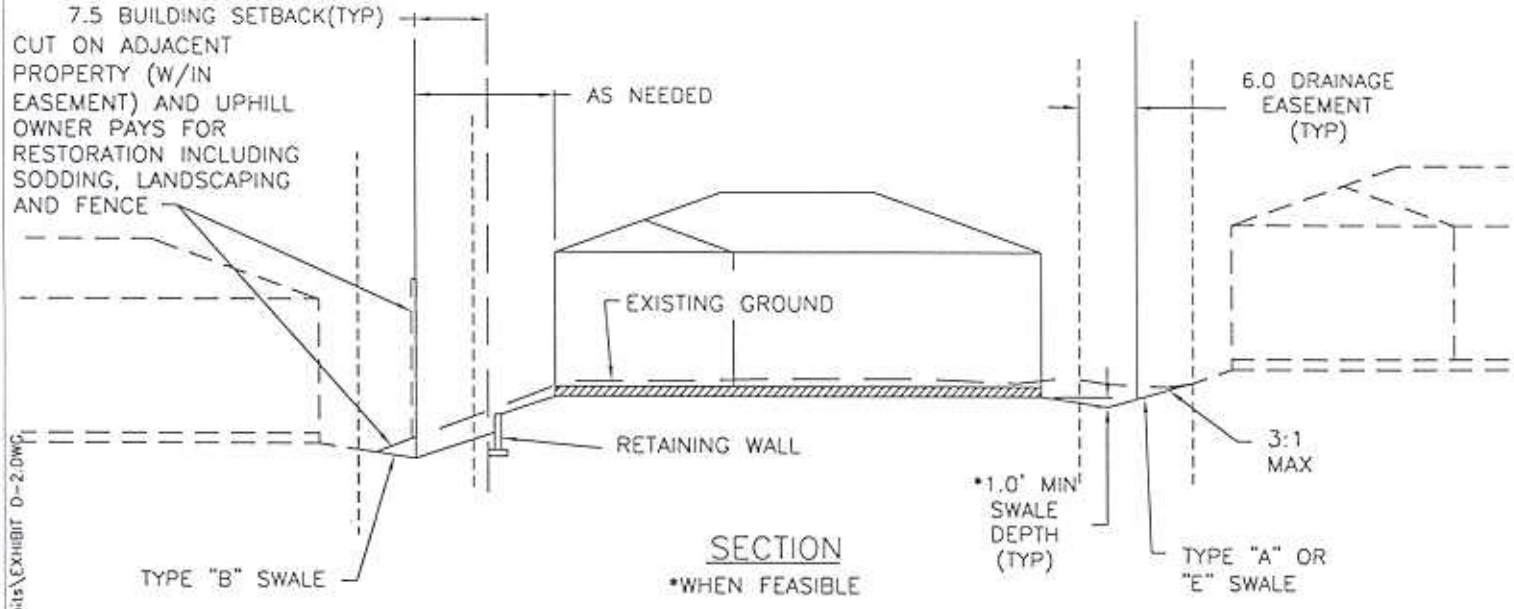


SECTION

*WHEN FEASIBLE

LOT GRADING ON A GRADIENT WHEN AN ADJACENT LOT IS EXTREMELY LOWER AND HOUSE CAN BE MOVED AWAY FROM BUILDING SETBACK

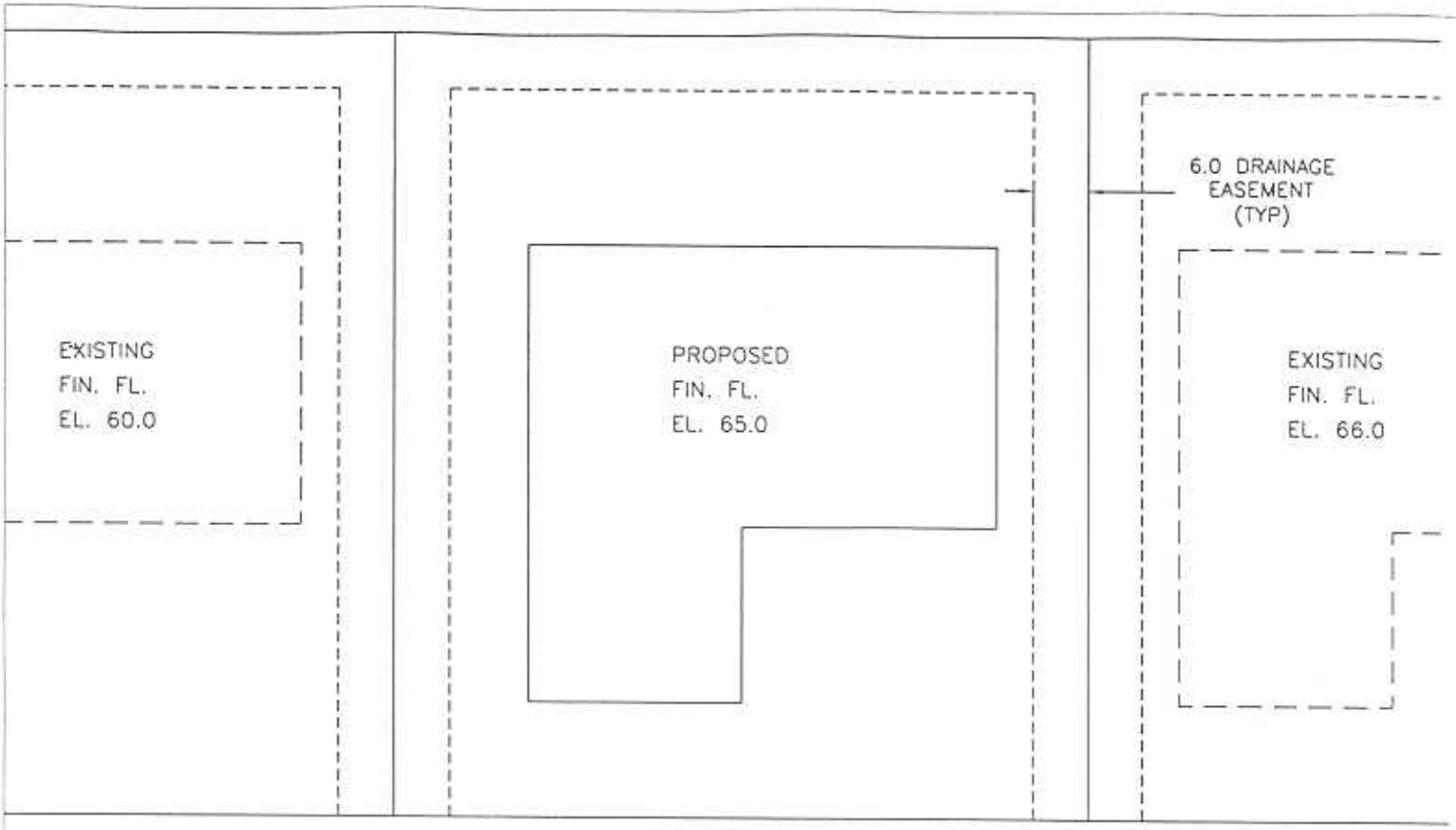
NOTES:

1. THE PROPOSED FIN. FLR. WAS APPROVED AT AN ELEVATION BETWEEN THE TWO EXISTING ELEVATIONS. IT CAN NOT BE HIGHER OR LOWER THAN ALL OF THE EXISTING NEIGHBORS.
2. THE ELEVATIONS SHOWN ABOVE ARE FOR ILLUSTRATIVE PURPOSES ONLY.
3. TECHNICALLY, THE CODE REQUIRES A PROPOSED F.F. EL. OF 64 AND CUT FOR THE HOUSE TO BE MINIMIZED WHICH CAUSES A CONFLICT. THIS TECHNIQUE, THEREFORE, GRANTS A PRE-APPROVED VARIANCE SINCE IT STRIVES TO MEET THE OVERALL INTENT OF BOTH PROVISIONS.

EXHIBIT "D-2"

K:\Ken Zogers\Residential Guideline\Lot Grading Exhibits\EXHIBIT D-2.DWG

Plotted: Aug 29, 2003 - 1:06pm by kzogers



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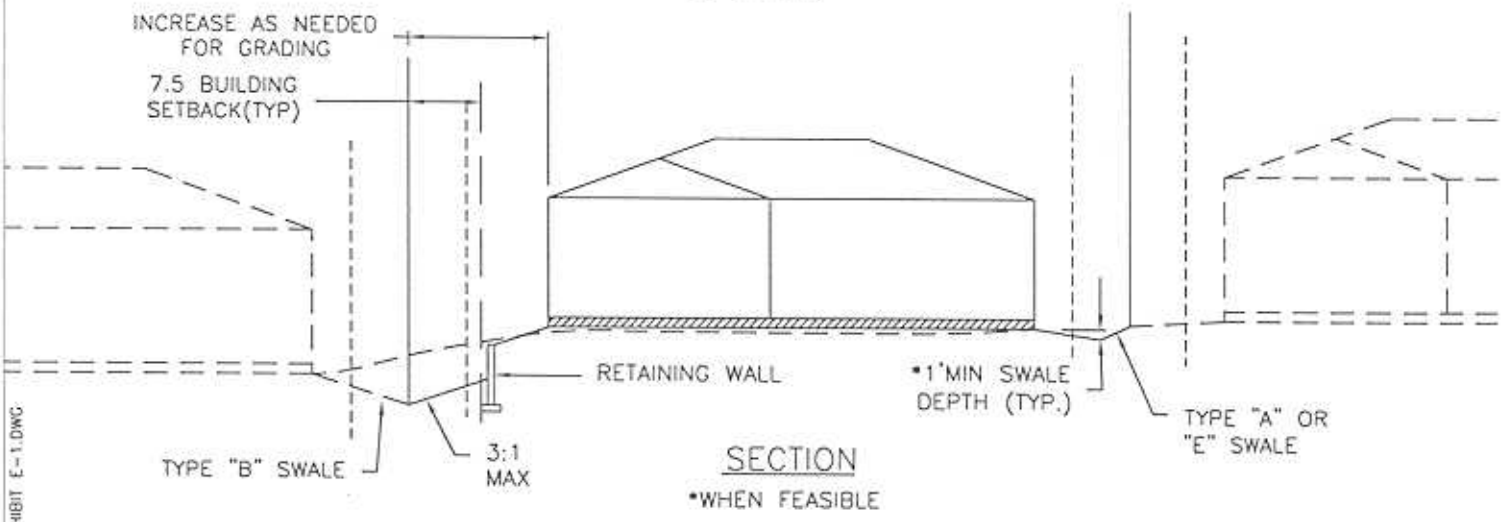


SECTION

*WHEN FEASIBLE

LOT GRADING ON A GRADIENT WHEN ADJACENT LOTS ARE SIGNIFICANTLY HIGHER OR LOWER AND HOUSE CAN BE LOCATED AWAY FROM LOW SIDE BUILDING SETBACK LINE

NOTES:

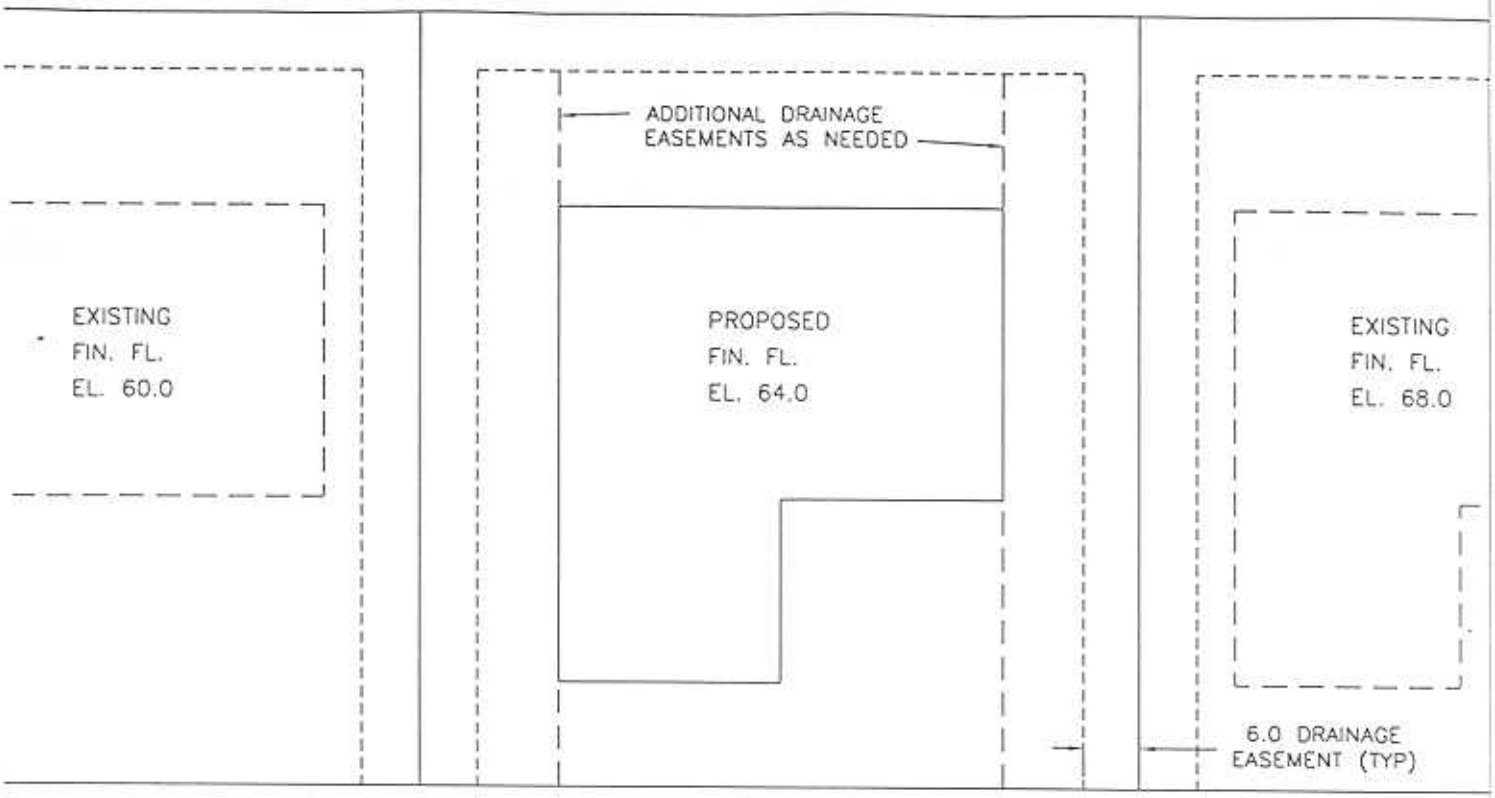
1. THE PROPOSED FIN. FLR. WAS APPROVED AT AN ELEVATION BETWEEN THE TWO EXISTING ELEVATIONS. IT CAN NOT BE HIGHER OR LOWER THAN ALL OF THE EXISTING NEIGHBORS.
2. THE ELEVATIONS SHOWN ABOVE ARE FOR ILLUSTRATIVE PURPOSES ONLY.
3. TECHNICALLY, THE CODE REQUIRES A PROPOSED F.F. EL. OF 63 AND CUT FOR THE HOUSE TO BE MINIMIZED WHICH CAUSES A CONFLICT. THIS TECHNIQUE, THEREFORE, GRANTS A PRE-APPROVED VARIANCE SINCE IT STRIVES TO MEET THE OVERALL INTENT OF BOTH PROVISIONS.

City of Deltona

EXHIBIT "E-1"

K:\Ken Zogers\Residential Guideline\Lot Grading Exhibits\EXHIBIT E-1.DWG

Plotted: Aug 29, 2003 - 1:09pm by kzogers



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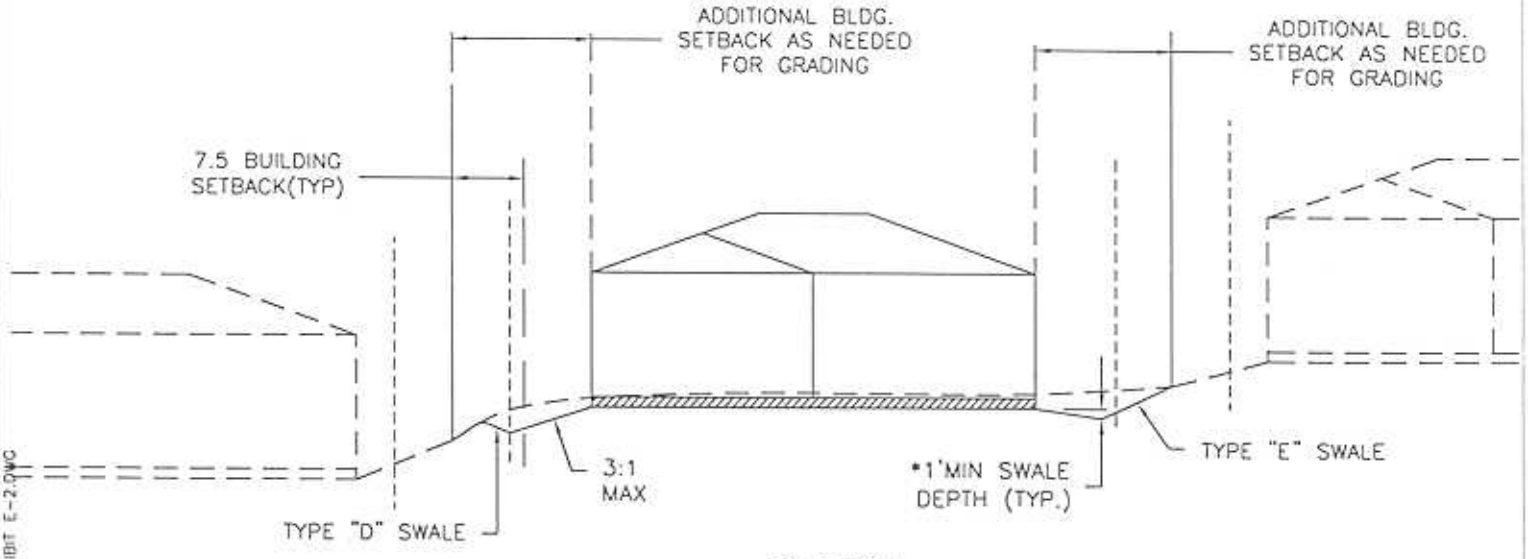


SECTION

*WHEN FEASIBLE

LOT GRADING WHEN ADJACENT LOTS ARE SIGNIFICANTLY HIGHER OR LOWER AND HOUSE CAN BE LOCATED AWAY FROM LOW SIDE BUILDING SETBACK LINE

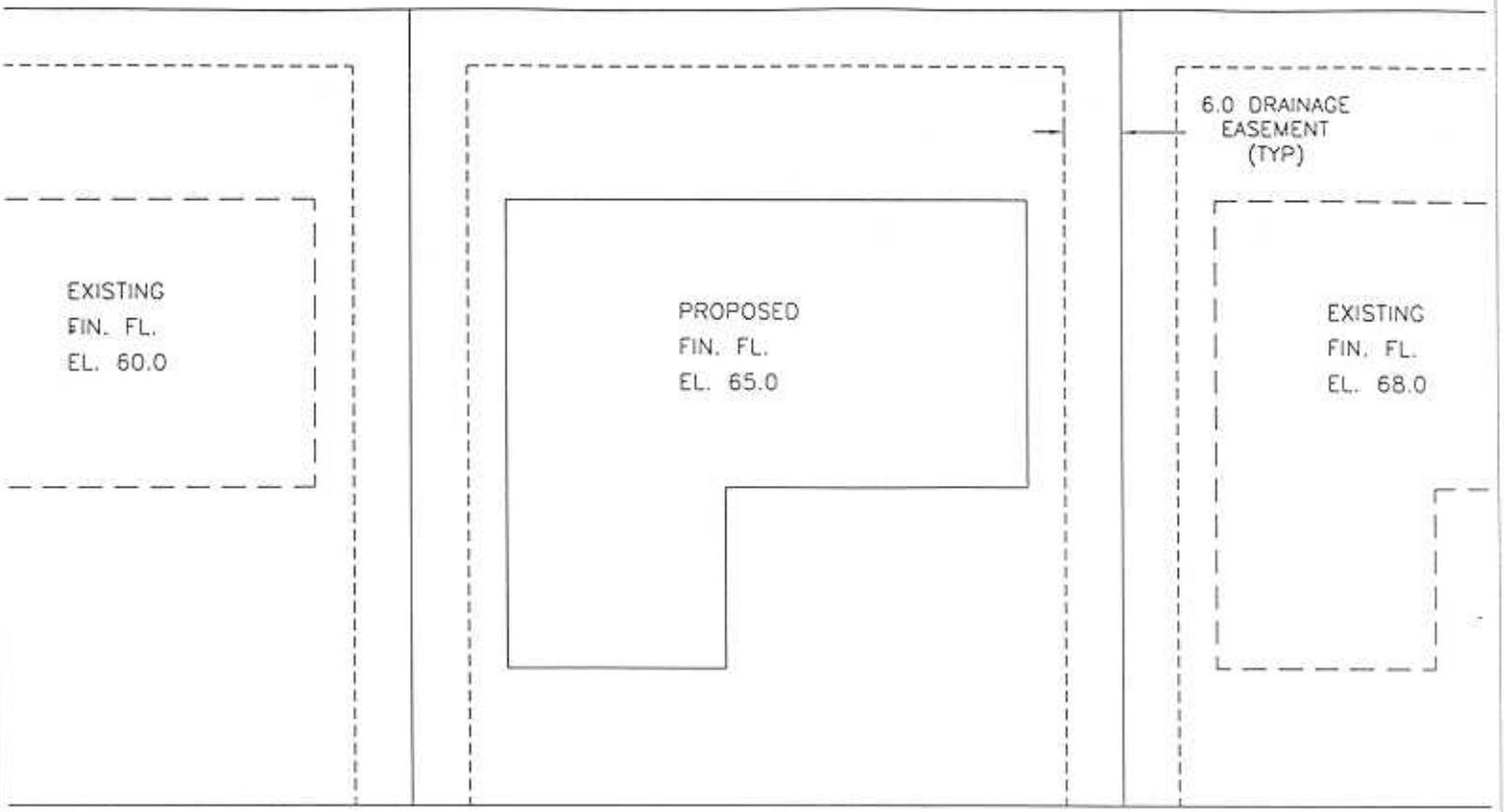
NOTES:
1. THE PROPOSED FIN. FLR. WAS APPROVED AT AN ELEVATION BETWEEN THE TWO EXISTING ELEVATIONS. IT CAN NOT BE HIGHER OR LOWER THAN ALL OF THE EXISTING NEIGHBORS.
2. THE ELEVATIONS SHOWN ABOVE ARE FOR ILLUSTRATIVE PURPOSES ONLY.
3. THE F.F. EL. MEETS CODE WITH NO VARIANCE.

City of Deltona

EXHIBIT "E-2"

K:\Ken Zogers\Residential Guideline\Lot Grading Exhibits\EXHIBIT E-2.DWG

Plotted: Aug 29, 2003 - 1:11pm by kzogers



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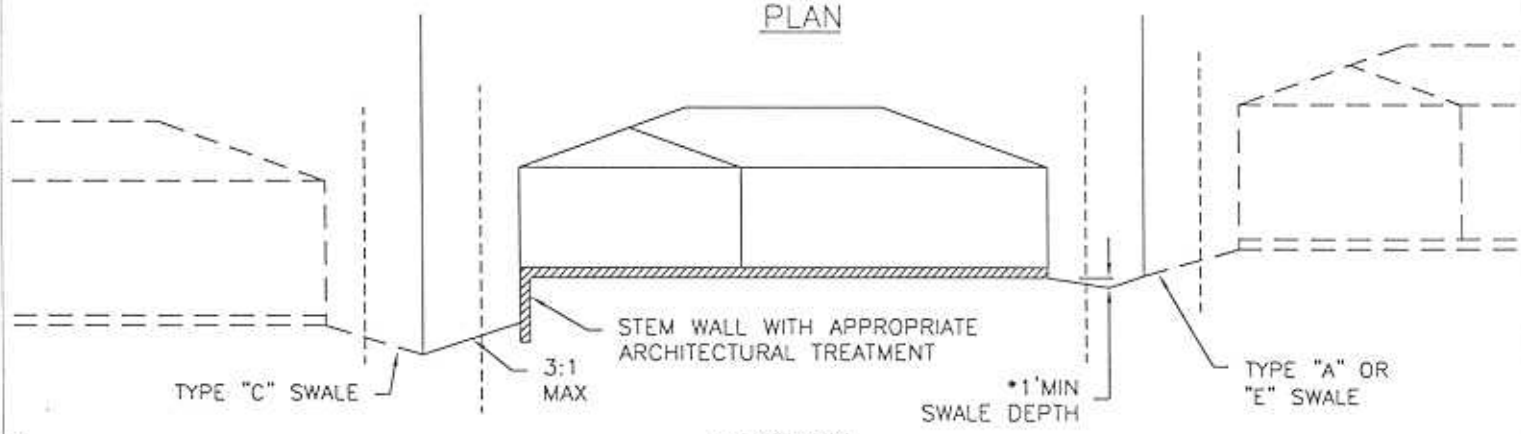


SECTION

*WHEN FEASIBLE

LOT GRADING ON A GRADIENT WHEN ADJACENT LOTS ARE SIGNIFICANTLY HIGHER AND LOWER AND ADJACENT LOTS WILL NOT ALLOW CONSTRUCTION W/IN THEIR EASEMENT

NOTES:

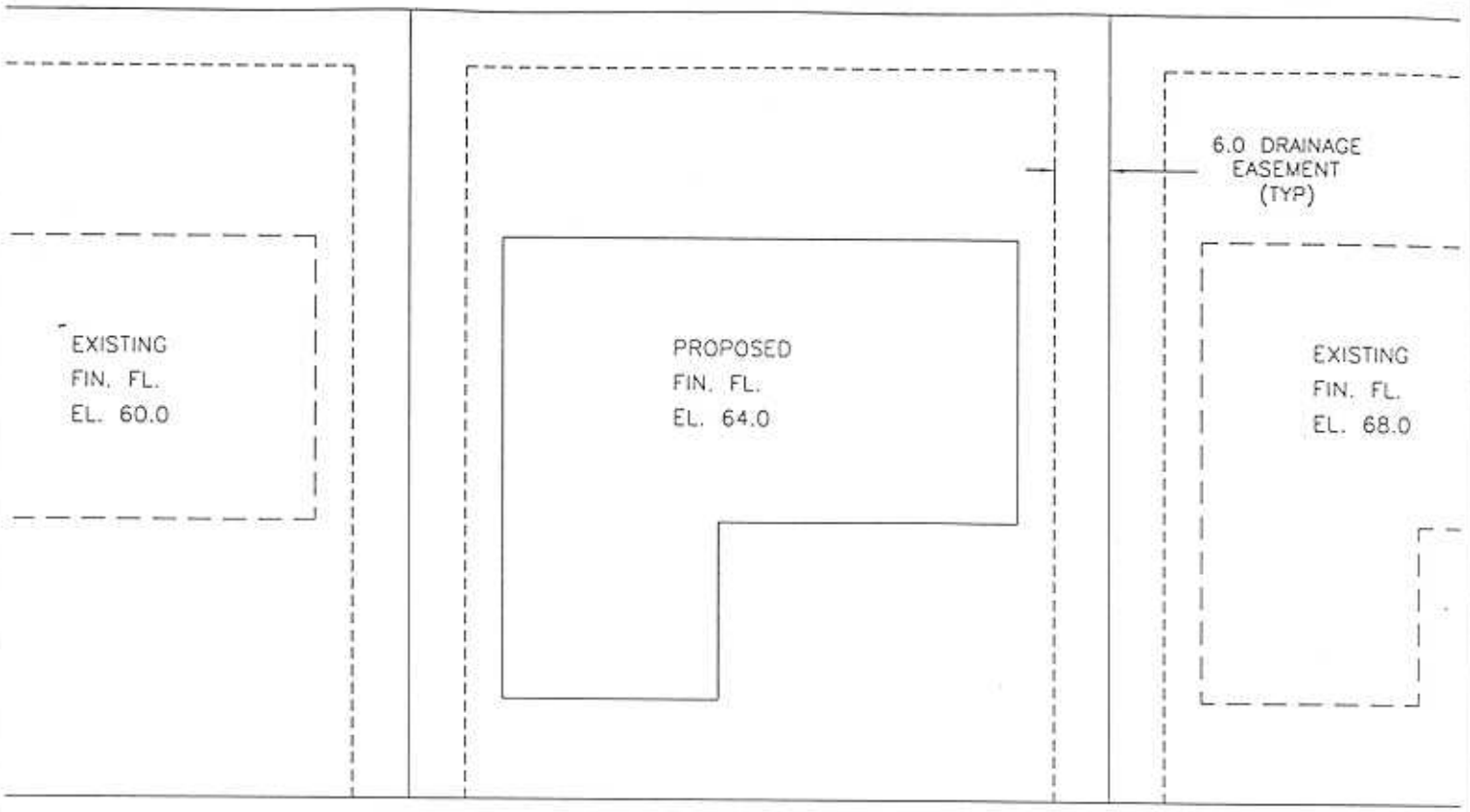
1. THE PROPOSED FIN. FLR. WAS APPROVED AT AN ELEVATION BETWEEN THE TWO EXISTING ELEVATIONS. IT CAN NOT BE HIGHER OR LOWER THAN ALL OF THE EXISTING NEIGHBORS.
2. THE ELEVATIONS SHOWN ABOVE ARE FOR ILLUSTRATIVE PURPOSES ONLY.
3. TECHNICALLY, THE CODE REQUIRES A PROPOSED F.F. EL. OF 64 AND CUT FOR THE HOUSE TO BE MINIMIZED WHICH CAUSES A CONFLICT. THIS TECHNIQUE, THEREFORE, GRANTS A PRE-APPROVED VARIANCE SINCE IT STRIVES TO MEET THE OVERALL INTENT OF BOTH PROVISIONS.

City of Deltona

EXHIBIT "F-1"

K:\Ken Zagers\Residential Guideline\Lot Grading Exhibits\EXHIBIT F-1.DWG

Plotted: Aug 29, 2003 - 1:15pm by kzagers



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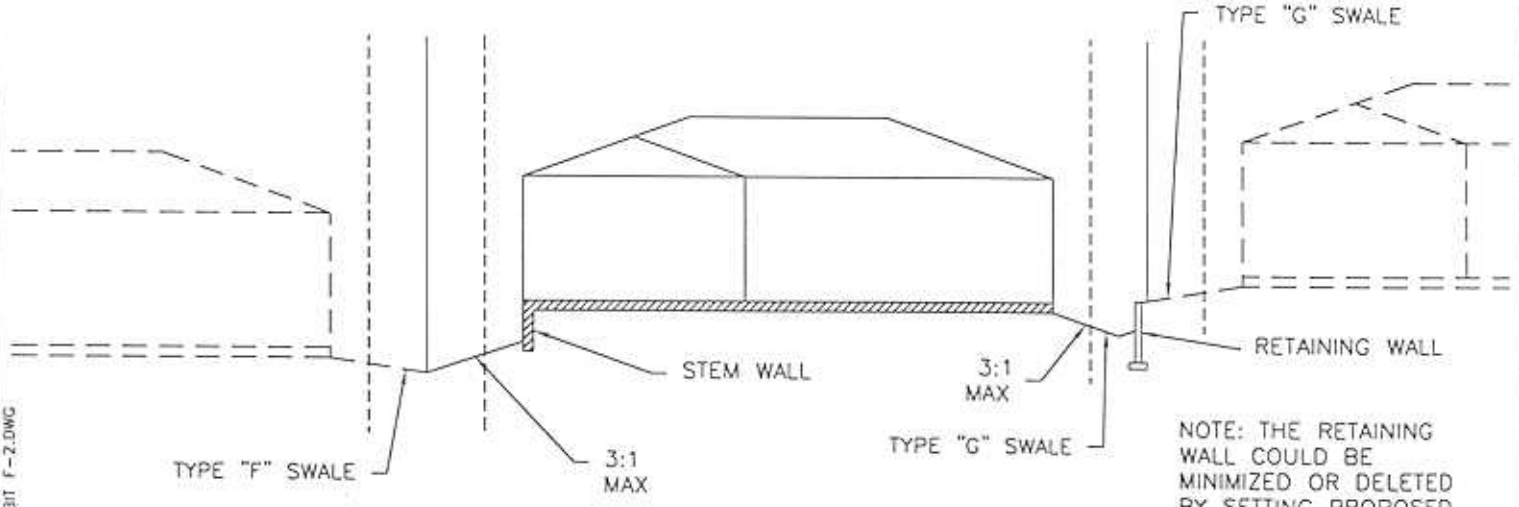


SECTION

NOTE: THE RETAINING WALL COULD BE MINIMIZED OR DELETED BY SETTING PROPOSED FIN. FLR. HIGHER AND MAKING THE STEM WALL MORE SIGNIFICANT.

LOT GRADING ON A GRADIENT WHEN ADJACENT LOTS ARE SIGNIFICANTLY HIGHER OR LOWER AND ADJACENT LOTS WILL NOT ALLOW CONSTRUCTION W/IN THEIR EASEMENT

NOTES:
1. THE PROPOSED FIN. FLR. WAS APPROVED AT AN ELEVATION BETWEEN THE TWO EXISTING ELEVATIONS. IT CAN NOT BE HIGHER OR LOWER THAN ALL OF THE EXISTING NEIGHBORS.
2. THE ELEVATIONS SHOWN ABOVE ARE FOR ILLUSTRATIVE PURPOSES ONLY.
3. THE F.F. EL. MEETS CODE WITH NO VARIANCE.

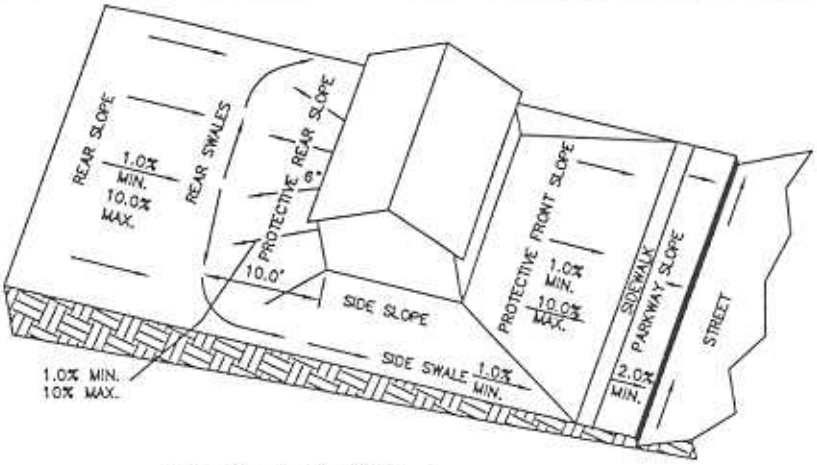
City of Deltona

EXHIBIT "F-2"

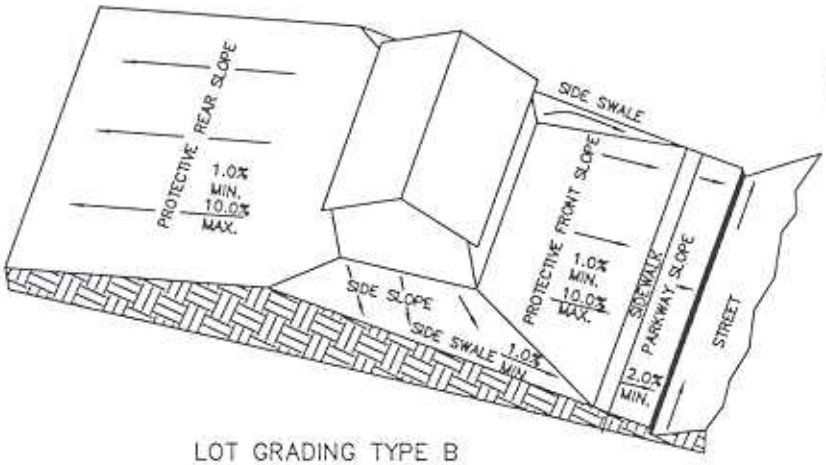
K:\Ken Zagers\Residential Guideline\Lot Grading Exhibits\EXHIBIT F-2.DWG
Plotted: Aug 29, 2003 - 1:22pm by kzagers

Group II – FHA/VA Grading Plan

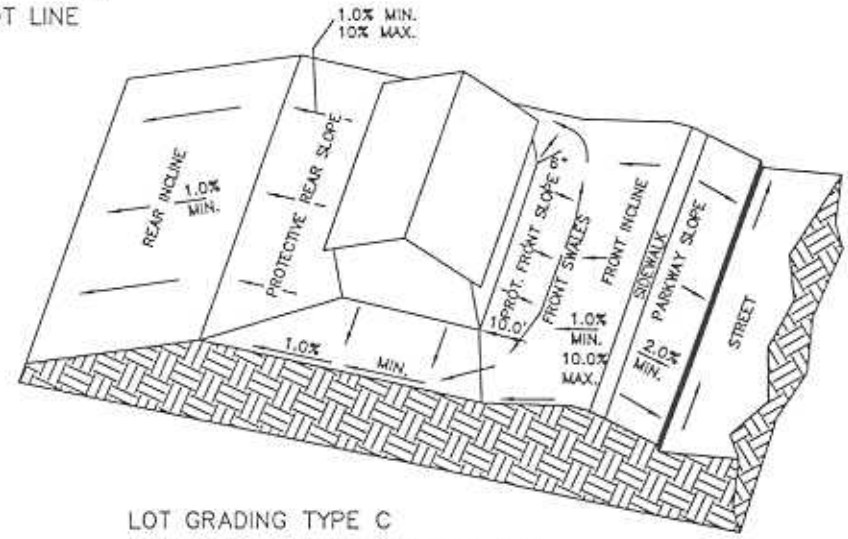
Exhibit K Typical FHA/VA Three Dimensional Grading Plan



LOT GRADING TYPE A
ALL DRAINAGE TO STREET



LOT GRADING TYPE B
DRAINAGE TO FRONT & REAR LOT LINE



LOT GRADING TYPE C
ALL DRAINAGE TO REAR LOT LINE

GENERAL NOTES:

1. EXCEPT AS NOTED, BUILDING PAD GRADING TO BE PERFORMED BY HOUSE CONTRACTOR AFTER COMPLETION OF SUBDIVISION IMPROVEMENTS
2. ALL FINISH FLOOR ELEVATION SHALL BE MINIMUM OF 8" ABOVE THE HIGHEST GRADE ADJACENT TO BUILDING PAD. SEE CURRENT BUILDING CODE. FLOOR ELEVATIONS SHOWN ARE BASED ON THE MINIMUM FRONT SETBACK. ALL GRADING TYPE A & B LOT FINISH FLOORS SHALL BE AT LEAST 1.0 FT. ABOVE THE ROAD CROWN ALONG LOT FRONTAGE.
3. DRIVEWAY SLOPES BREAKS SHALL NOT EXCEED AN ALGEBRAIC DIFFERENCE OF ±14% WITHOUT A PROPER VERTICAL CURVE.
4. MEANDER SWALES AROUND SPECIMEN TREES AND DO NOT DISTURB WETLAND VEGETATION.

TYPICAL FHA/VA THREE DIMENSIONAL GRADING PLAN

City of Deltona

EXHIBIT "K"

K:\Ken Zogera\Residential Guideline\Lot Grading Exhibits\LOT GRADING.DWG
Plotted: Jul 29, 2003 - 2:46pm by kzogera

Group III – Retaining Walls

Exhibit M1 Retaining Wall – Instructional Notes

Exhibit M2 Retaining Wall – Notes

Exhibit M3 Retaining Wall – Details

Exhibit M4 Retaining Wall – Data

Exhibit M5 Control Drawing General Notes

The Retaining Wall Standard Drawings consist of Standard Index Nos. I-1400, 1401, 1402 and S-1403. These Standard Drawings are intended to work in conjunction with each other and the LRFD Retaining Wall Program, developed by the Structures Design Office.

The intent and use of Standard, Semi-Standard and Instructional Drawings are described in the Structures Design Office Standard Drawings Preface, Index No. I-001.

Design assumptions used in the development of the Standard Drawings may be found in 'Retaining Wall Notes' within the Program. The Standard Drawings and Program are intended for conventional retaining walls only, not abutments. The EOR should consider the applicability of the following: overall stability, settlement and seismic loading.

The Engineer of Record (EOR) shall be responsible for the Retaining Wall Design in its entirety. The EOR should complete and/or alter the Standard Drawings to suit the particular design. The EOR should consider the appropriateness of the use of the Standard Drawings and Program if the particulars of the design conflict significantly with the assumptions used in the development of the Standard Drawings.

The Standard Drawings are intended to work in conjunction with Retaining Wall Control Drawings elsewhere within the Plans. The Control Drawings should define geometrics, locations and other specifics of the Retaining Wall such that when used in conjunction with the Standard Drawings, the Contractor has sufficient information for construction.

Control Drawings typically show:

Plan View
- Wall Location
- Begin/End Wall Stationing and Offset
- Wall Joint/Expansion Joint Stationing and Offset
- Offset definition, usually from baseline to front face of wall
- Step Locations

Elevation
- Top/Bottom of Footing Elevation
- Groundline Elevation
- Top of Wall Elevation
- Top of Barrier Elevation

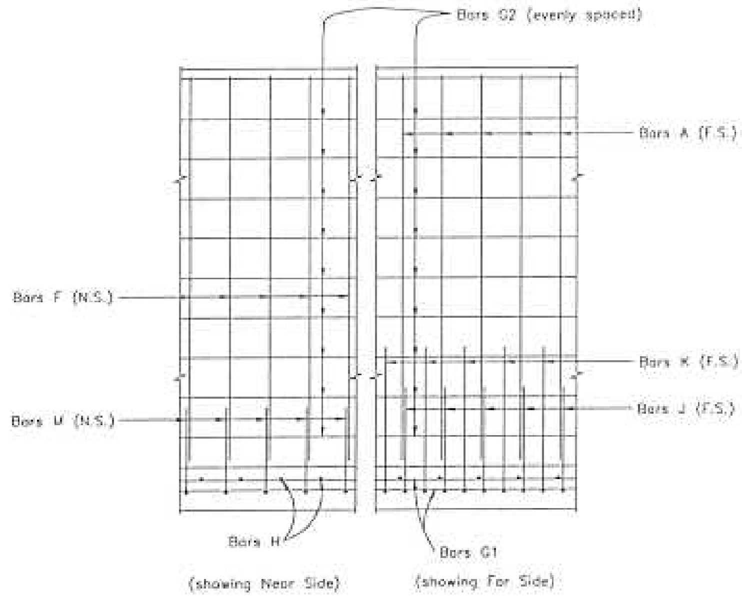
The Program outputs five text files: retwall_line1.txt, retwall_line2.txt, retwall_line3.txt, retwall_line4.txt and retwall_line5.txt . These five text files correspond sequentially to the five Retaining Wall Data tables in Standard Index No. S-1403. The text files can be inserted into the tables by using the 'Include' Key-In Utility in MicroStation at the active points in each table. Font 69 must be used to align inserted text with table columns.

RETAINING WALL - INSTRUCTIONAL NOTES

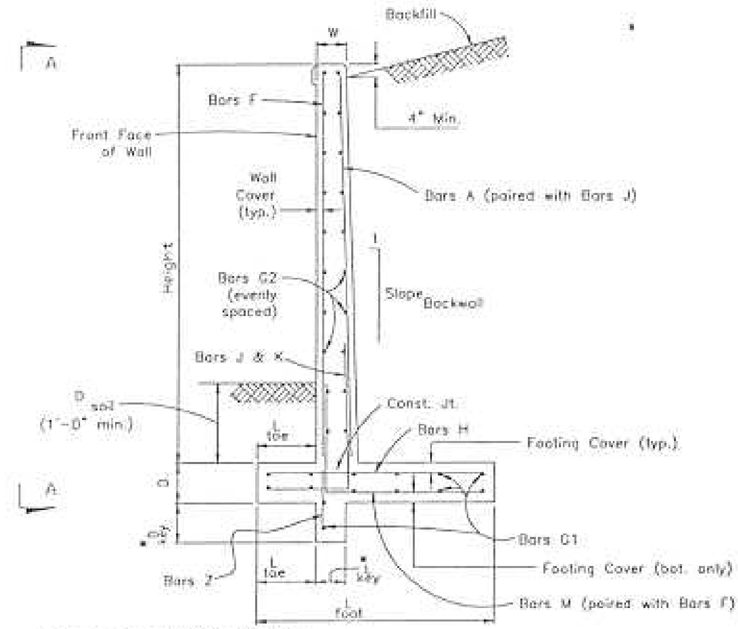
EXHIBIT "M1"

K:\Ken Zagers\Residential Guideline\Lot Grading Exhibits\RW-1.DWG

Plotted: Jul 29, 2003 - 3:06pm by kzagers



VIEW A-A
(shear key not shown)



* Shear Key is required only when specified by the Engineer

TYPICAL SECTION

NOTES

SPECIFICATIONS:
American Assoc. of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications (current edition) Florida Dept. of Transportation Structures Design Guidelines (current edition) Florida Dept. of Transportation Standard Specifications for Road and Bridge Construction (current edition)

MATERIALS:
All reinforcing steel shall conform to ASTM A615 Grade 60.

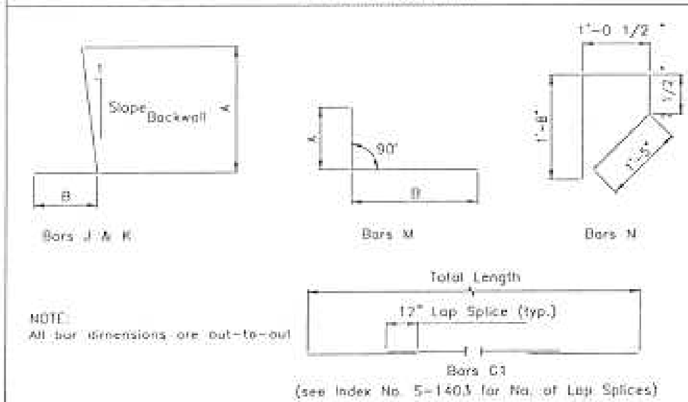
SURFACE FINISH:
A Class 5 Applied Finish Coating shall be applied to the top of the wall and the exposed face above ground line.

ARCHITECTURAL TREATMENT:
Alternate Architectural Treatments may be substituted for the Striated Pattern shown when approved by the Engineer. Concrete required for Architectural Treatment is not included in the quantities.

TRAFFIC RAILING BARRIER:
If there is a Traffic Railing Barrier on the wall, Wall Joints and Barrier V-Grooves shall align and Wall Expansion Joints and Barrier Open Joints shall align.

PAYMENT:
All Retaining Wall costs, including all miscellaneous costs, shall be paid for at the unit contract price for either Class ??, ??? or ?! Concrete (Retaining Walls) (CY) and Reinforcing Steel (Retaining Walls) (LBS). Retaining Wall quantities shall not include concrete nor reinf. steel for Traffic Railing Barrier. Traffic Railing Barrier (including Bars 5V) shall be paid for under Traffic Railing (F&I) (Barrier).

BENDING DIAGRAM



NOTE:
All bar dimensions are out-to-out

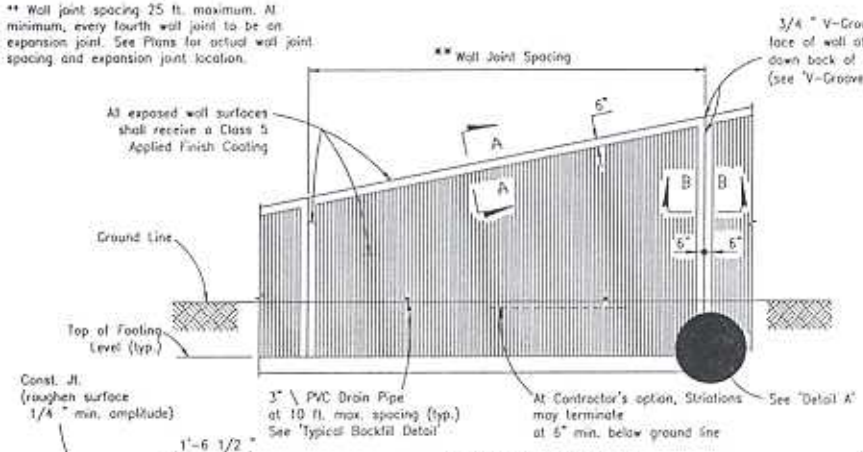
RETAINING WALL — NOTES

City of Deltona

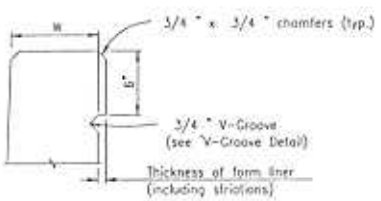
EXHIBIT "M2"

K:\Ken Zagers\Residential Guideline\Lot Grading Exhibits\RW-2.DWG
Plotted: Jul 29, 2003 5:03pm by kzagers

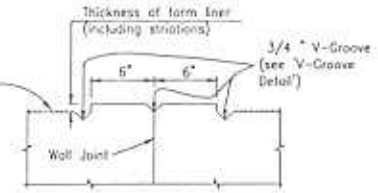
** Wall joint spacing 25 ft. maximum. At minimum, every fourth wall joint to be an expansion joint. See Plans for actual wall joint spacing and expansion joint location.



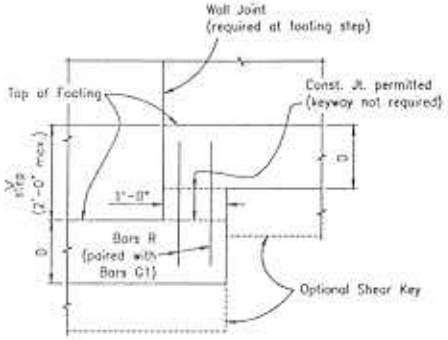
FRONT ELEVATION



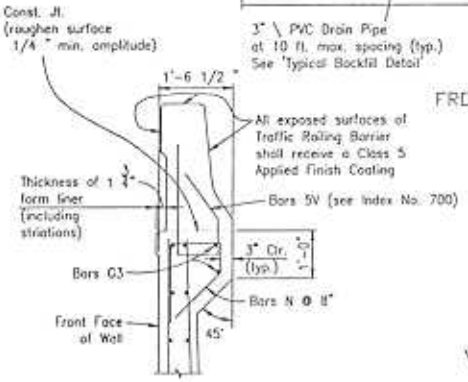
SECTION A-A



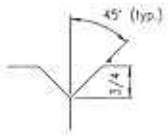
SECTION B-B



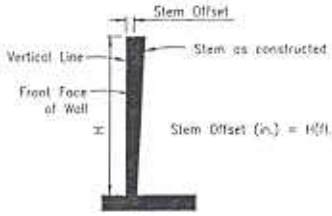
DETAIL A



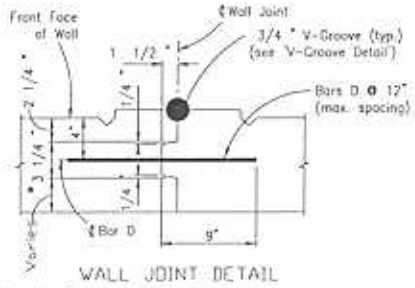
BARRIER ON WALL DETAIL
(for Traffic Railing Barrier details see Structures Standard Index No. 700)



V-GROOVE DETAIL

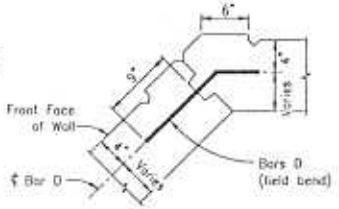


STEM OFFSET VALUES

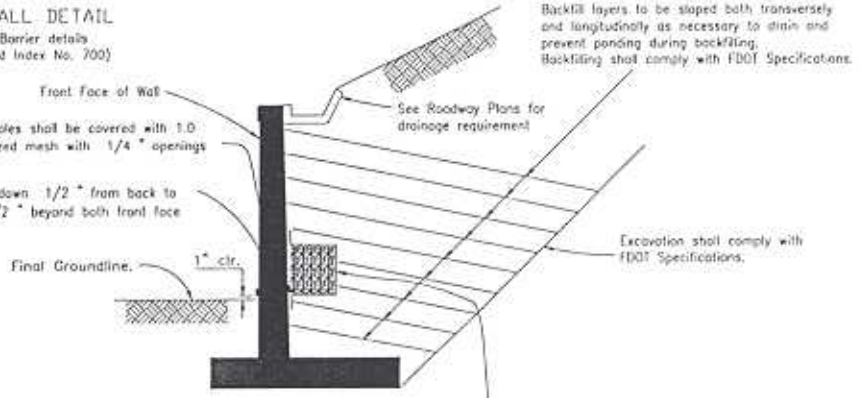


WALL JOINT DETAIL

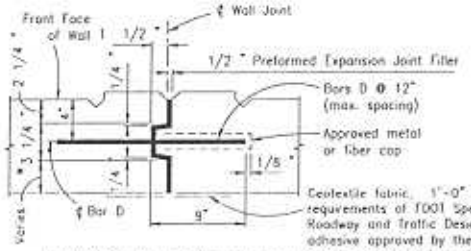
* Key to stop 6" from top of wall. Joint across top of wall to be straight line.



TYPICAL CORNER JOINT DETAIL



TYPICAL BACKFILL DETAIL



EXPANSION JOINT DETAIL

RETAINING WALL – DETAILS

EXHIBIT "M3"

K:\Ken Zagers\Residential Guideline\Lot Grading Exhibits\RW-3.DWG
Plotted: Jul 29, 2003 - 5:09pm by kzagers

RETAINING WALL DATA

WALL DIMENSIONS

Wall No.	Begin Station	Begin Offset	End Station	End Offset	Height Begin ft.	Height Begin in.	Height End ft.	Height End in.	Wall Length ft.	Wall Length in.	D in.	W in.	L_{foot} ft.	L_{foot} in.	L_{toe} ft.	L_{toe} in.	Slope Backwall	D_{soil} ft.	D_{soil} in.	L_{key} in.	D_{key} in.	V_{step} in.	Wall Cover in.	Ftg.Cov. (typ.) in.	Ftg.Cov. (bot.) in.

BILL OF REINFORCING STEEL

Wall No.	Bars J Size	Bars J No.	Bars J Spacing in.	Bars J A Begin ft.	Bars J A Begin in.	Bars J A End ft.	Bars J A End in.	Bars J B ft.	Bars J B in.	Bars J Average Total Length ft.	Bars J Average Total Length in.	Bars K Size	Bars K No.	Bars K Spacing in.	Bars K A Begin ft.	Bars K A Begin in.	Bars K A End ft.	Bars K A End in.	Bars K B ft.	Bars K B in.	Bars K Average Total Length ft.	Bars K Average Total Length in.	Bars M Size	Bars M No.	Bars M A ft.	Bars M A in.	Bars M B ft.	Bars M B in.	Bars M Total Length ft.	Bars M Total Length in.

BILL OF REINFORCING STEEL

Wall No.	Bars H Size	Bars H No.	Bars H Spacing in.	Bars H Length ft.	Bars H Length in.	Bars G1 Size	Bars G1 No.	Bars G1 Spacing in.	Bars G1 No. of Lap Splices	Bars G1 Total Length ft.	Bars G1 Total Length in.	Bars R Size	Bars R No.	Bars R Length ft.	Bars R Length in.	Bars Z Size	Bars Z No.	Bars Z Spacing in.	Bars Z Length ft.	Bars Z Length in.	Bars A Size	Bars A No.	Bars A Length Begin ft.	Bars A Length Begin in.	Bars A Length End ft.	Bars A Length End in.	Bars A Average Length ft.	Bars A Average Length in.

BILL OF REINFORCING STEEL

Wall No.	Bars F Size	Bars F No.	Bars F Spacing in.	Bars F Length Begin ft.	Bars F Length Begin in.	Bars F Length End ft.	Bars F Length End in.	Bars F Average Length ft.	Bars F Average Length in.	Bars G2 Size	Bars G2 No.	Bars G2 Length ft.	Bars G2 Length in.	Bars D Size	Bars D No.	Bars D Length ft.	Bars D Length in.	Bars N Size	Bars N No.	Bars N Total Length ft.	Bars N Total Length in.	Bars G3 Size	Bars G3 No.	Bars G3 Length ft.	Bars G3 Length in.

ESTIMATED QUANTITIES

Wall No.	Concrete Footing ◆ C. Y.	Concrete Wall ◆ C. Y.	Concrete TOTAL C. Y.	Reinf. Steel ◆ LBS.

QUANTITIES NOTES:

◆ Includes concrete for optional shear key.

◆ Includes additional concrete at top of wall for support of optional traffic railing barrier but does not include concrete for barrier itself (see Index No. 1401 - Payment note).

◆ Does not include Bars SV or any other reinf. steel for optional traffic railing barrier (see Index No. 1401 - Payment note).

NOTES:

1. Concrete Class (f'c =)
2. A value of '0' for Slope Backwall indicates front and back of wall are parallel.
3. Dsoil is typical depth of soil and is used for design purposes only. See Control Drawings for actual ground line.
4. Non-zero values for Lkey and Dkey indicate the existence of a shear key.
5. A non-zero value for Vstep indicates the existence of a footing step, see Control Drawings for location.
6. Bars J, K, A and F vary uniformly between begin and end wall heights as indicated by begin and end dimensions.
7. The number of G1 Bars includes 2 additional bars when a shear key is specified.
8. For walls with variable begin/end height, Bars G2 shall be formed such that they are evenly spaced throughout length of wall.
9. Non-zero values for Bars N and Bars G3 indicate the existence of a barrier on the wall.

RETAINING WALL - DATA

City of Deltona — Incorporated December 31, 1995

EXHIBIT "M4"

K:\Ken Zagers\Residential Guidelines\Lot Grading Exhibits\RW-4.DWG

Plotted: Jul 29, 2003 - Written by Rogers

GENERAL NOTES

1. CONSTRUCTION SPECIFICATIONS:
Florida Department of Transportation "Standard Specifications for Road and Bridge Construction", (2000) and supplements thereto.

2. DESIGN SPECIFICATIONS: Design shall be in accordance with the following specifications:

AASHTO "Standard Specifications for Highway Bridges", 16th Edition, and applicable interim specifications.

Florida Department of Transportation "Structures Design Guidelines".

"Insitu Soil Improvement Techniques" AASHTO-AGC-ARTBA Task Force 27 Ground Modification Techniques, January 1990.

3. MATERIAL STRESSES: All allowable stresses shall be in accordance with the current AASHTO Specifications for all the materials shown on the plans.

a. Concrete Compressive Strength: Class ____ f'c = ____ psi min.

b. Reinforcing Steel: ASTM A615, Grade 60.

4. DESIGN METHOD: Load Factor, except that internal and external stability shall be designed for service loads.

The following minimum factors of safety shall be utilized in the design of the walls:

Overturning	F.S. = 2.0
Sliding	F.S. = 1.5
Bearing Capacity	F.S. = 2.5
Internal Pullout	F.S. = 1.5 (Allowable Deflection = 3/4 ")
Overall Stability	F.S. = 1.5
Steel	0.55 Fy (Straps)
Plastics	0.19 Fu (HDPE) (Permanent Walls) 0.29 Fu (Polyester and HDPE) (Temporary Walls)
Steel Connections	See AASHTO Specifications

5. DESIGN LOADS:
Truck Loading: HS20-44
Sidewalk Loading: 85 lbs. per square foot

6. For Typical Sections through roadway, see Roadway Plans.

7. Concrete facing panel surface treatment shall be ______________

8. Longitudinal dimensions shown in the plans are measured along the exterior face of the wall. Elevations shown are to the top of coping, top of leveling pad or top of wall footing.

9. Leveling Pad: The leveling pad shall be 1'-6" min. below final ground line.

10. A structural extension of the connection of the wall panel to the soil reinforcement shall be used whenever necessary to avoid the cutting or excessive skewing (greater than 15 degrees) of the soil reinforcements at piles or other obstructions.

11. The soil reinforcement and fasteners (if required) for the abutment backwall shall be designed and furnished by the MSE wall company. The soil reinforcement shall be designed to resist a horizontal load of _kips per foot of backwall width. The cost of the soil reinforcement and fasteners to be included in the cost of the Retaining Wall System. Installation shall be by the contractor.

12. These walls are to be designed for the settlements noted for each wall. Long term settlement is measured from the beginning of wall construction.

GEOTECHNICAL INFORMATION TABLE

	Reinforced Soil & Random Backfill	Loose Fine Sand	Firm Fine Sand	Loose Clayey Fine Sand	Firm Clayey Fine Sand
Depth Below Exist. Ground Line for: Wall 1 and 2 Wall 3 and 4		0 - 6 ft 0 - 9 ft	6 - 30 ft 9 - 24 ft	30 - 40 ft -	- 20 - 40 ft
Unit Weight:	106 pcf Weight In-Place	115 pcf	115 pcf	115 pcf	119 pcf
Cohesion:	0	0	0	400 psf	400 psf
Internal Friction:	30°	30°	32°	18°	18°

If the unit weight and/or \ angle of the fill proposed by the Contractor differs from the above, the Project Engineer shall contact both the District Geotechnical Engineer and the Wall Designer for a possible redesign.

Design Based Internal Friction Angle = 30 degrees (Sand Backfill)
34 degrees (Limerock) (Dade, Monroe Co.)

Refer to Plan and Elevation sheets of individual walls for minimum reinforcement strip/mesh length, allowable bearing capacities, minimum wall embedment and anticipated long term and differential settlements.

The applicable wall systems for each wall location are listed below. Wall systems not listed have been deemed unacceptable for use at that specific site due to the environment, excessive settlement etc. and shall not be used, and will not be considered for future substitution during construction.

Wall No. ____ Environmental Classification: ____________ Aggressive

Long Term Settlement ____ in.
Short Term Settlement ____ in.
Differential Settlement ____ in./foot

The following wall systems are acceptable for use at this location:

INSTRUCTIONS TO DESIGNER:
1. Fill in design values in the General Notes (3a, 7, & 11) and add/modify/delete notes as necessary.
2. Revise values shown in the Geotechnical Information Table based on soil conditions for this particular project. The values shown are for demonstrative purposes only.
3. List each wall separately showing the environmental classification, settlement values and applicable wall systems.

PLEASE DELETE THIS NOTE UPON COMPLETION OF THIS DRAWING.

SOIL REINFORCEMENT LENGTHS FOR EXTERNAL STABILITY (0.7h):

Wall Height (feet)										
* Reinforcement Length (feet)										
Bearing Pressure (psf)										

* The reinforcement strap lengths shown in this column are minimum lengths required for external stability. The proprietary wall companies are responsible for internal stability of the retaining walls. The reinforcement lengths used in the construction of the retaining walls shall be the longer of that required for internal or external stability.

CONTROL DRAWING GENERAL NOTES

EXHIBIT "M5"

c:\Ken Zeigers\Residential Guideline\Lot Grading Exhibits\RW-5.DWG

Plotted: Jul 29, 2003 5:08pm by kzogers

Group IV – Swale Details

Type “A” Swale (Standard)

Type “B” Swale (with retaining wall)

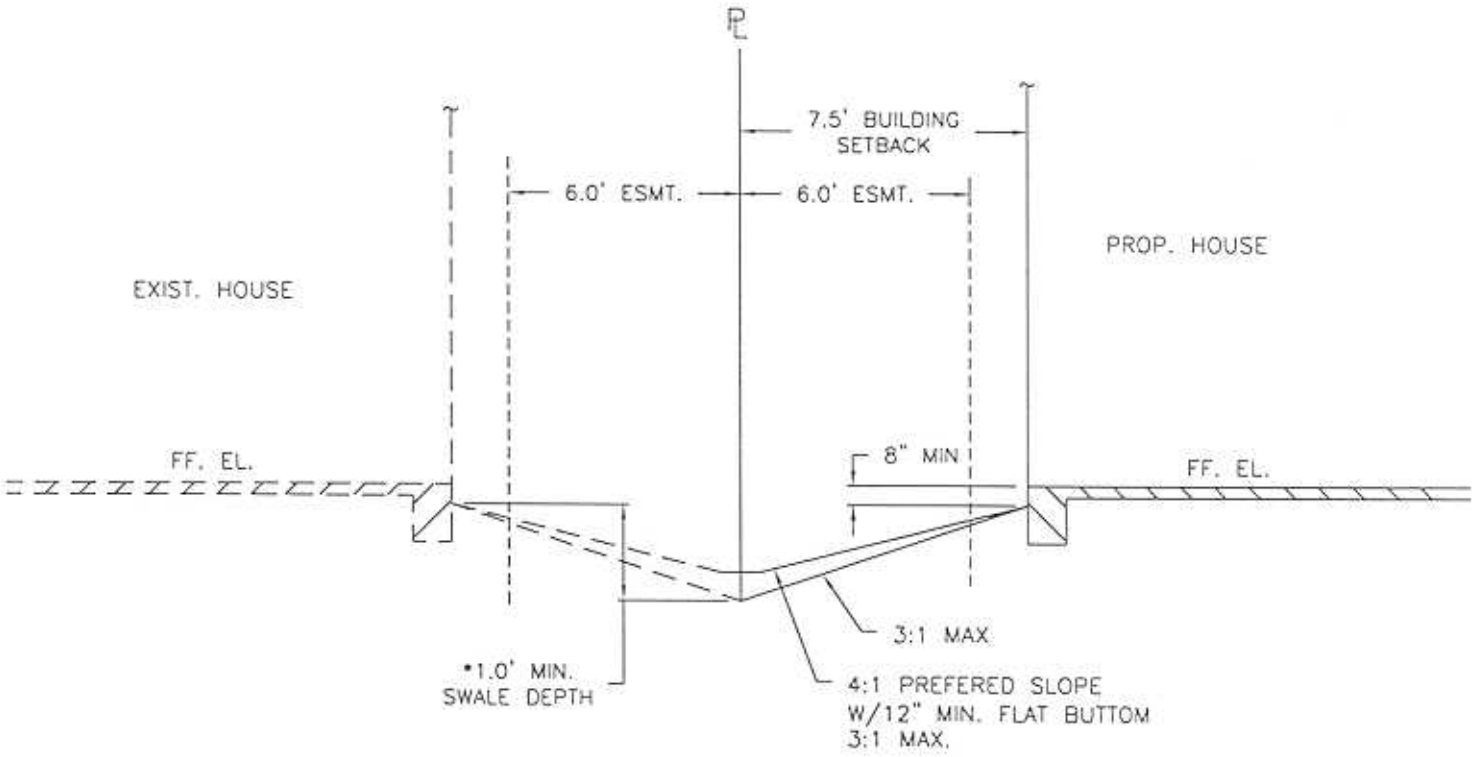
Type “C” Swale

Type “D” Swale (When proposed lot is higher than adjacent lot and the required swale cannot be graded centered on the property line)

Type “E” Swale (When proposed lot is lower than adjacent lot and the required swale cannot be graded centered on the property line)

Type “F” Swale

Type “G” Swale



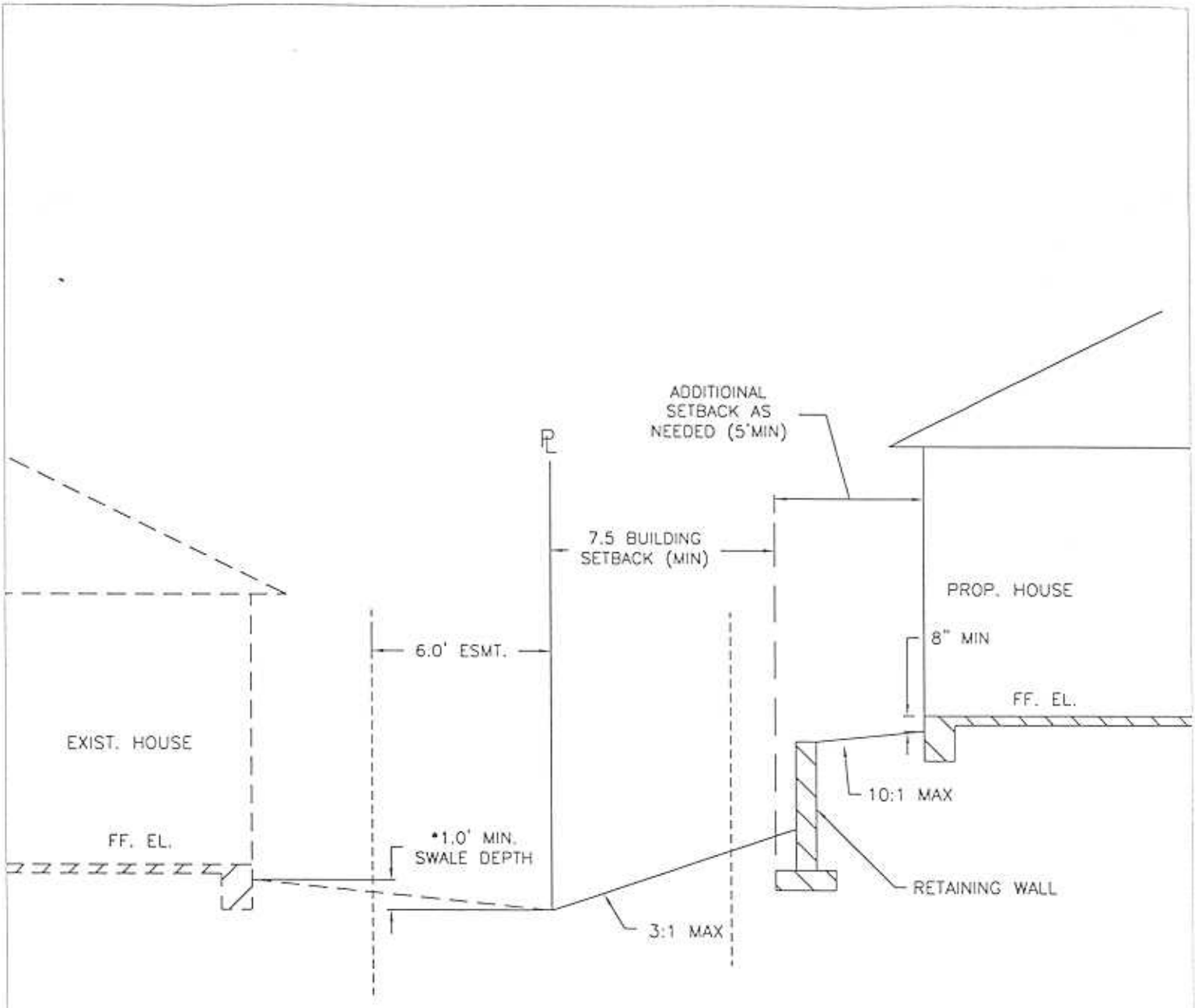
*WHEN FEASIBLE

TYPE "A" SWALE

(STANDARD)

K:\Ken Zagers\Residential Guideline\Lot Grading Exhibits\SWALE DETAILS A-G.DWG

Plotted: Aug 29, 2003 - 2:32pm by kzagers



*WHEN FEASIBLE

TYPE "B" SWALE

(WITH RETAINING WALL)

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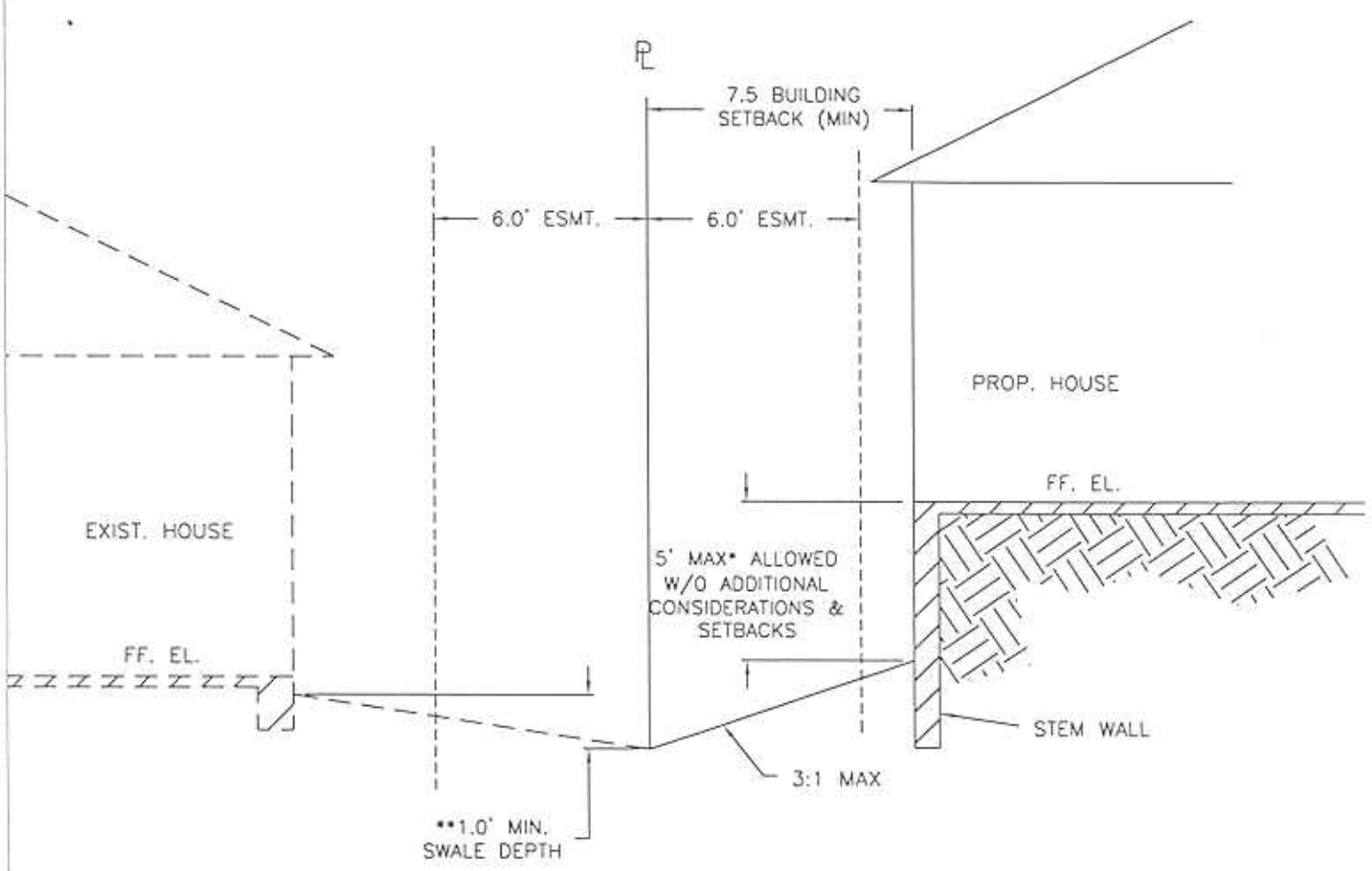
Plotted: Aug 29, 2003 - 2:32pm by kzogers



*NOTE: SEE SECTION 7.4 FOR APPROPRIATE CONSTRUCTION MATERIALS.

**WHEN FEASIBLE

TYPE "C" SWALE

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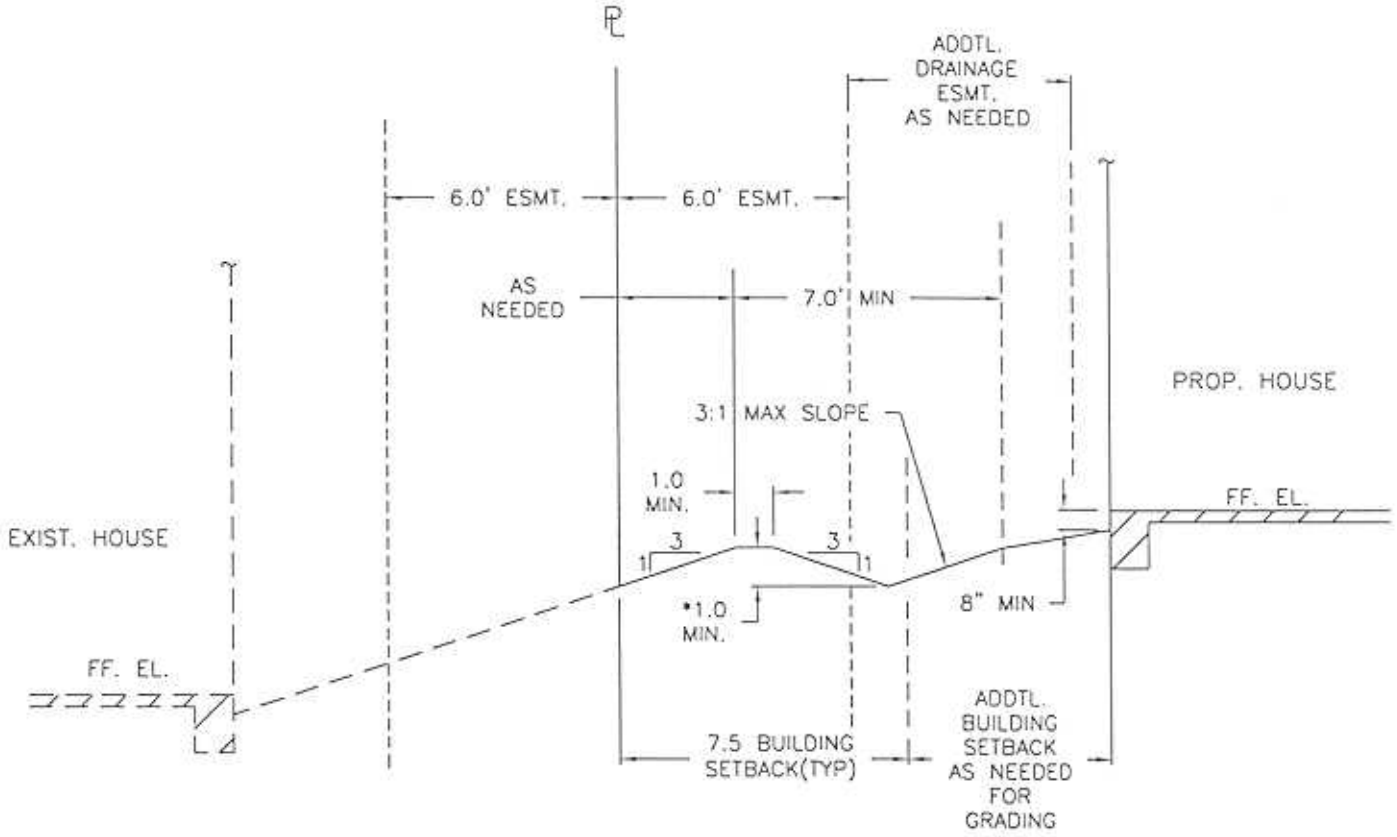
Plotted: Aug 29, 2003 - 2:32pm by kzogers



*WHEN FEASIBLE

TYPE "D" SWALE

(WHEN PROPOSED LOT IS HIGHER THAN ADJACENT LOT AND THE REQUIRED SWALE CAN NOT BE GRADED CENTERED ON THE EXISTING PROPERTY LINE).

City of Deltona

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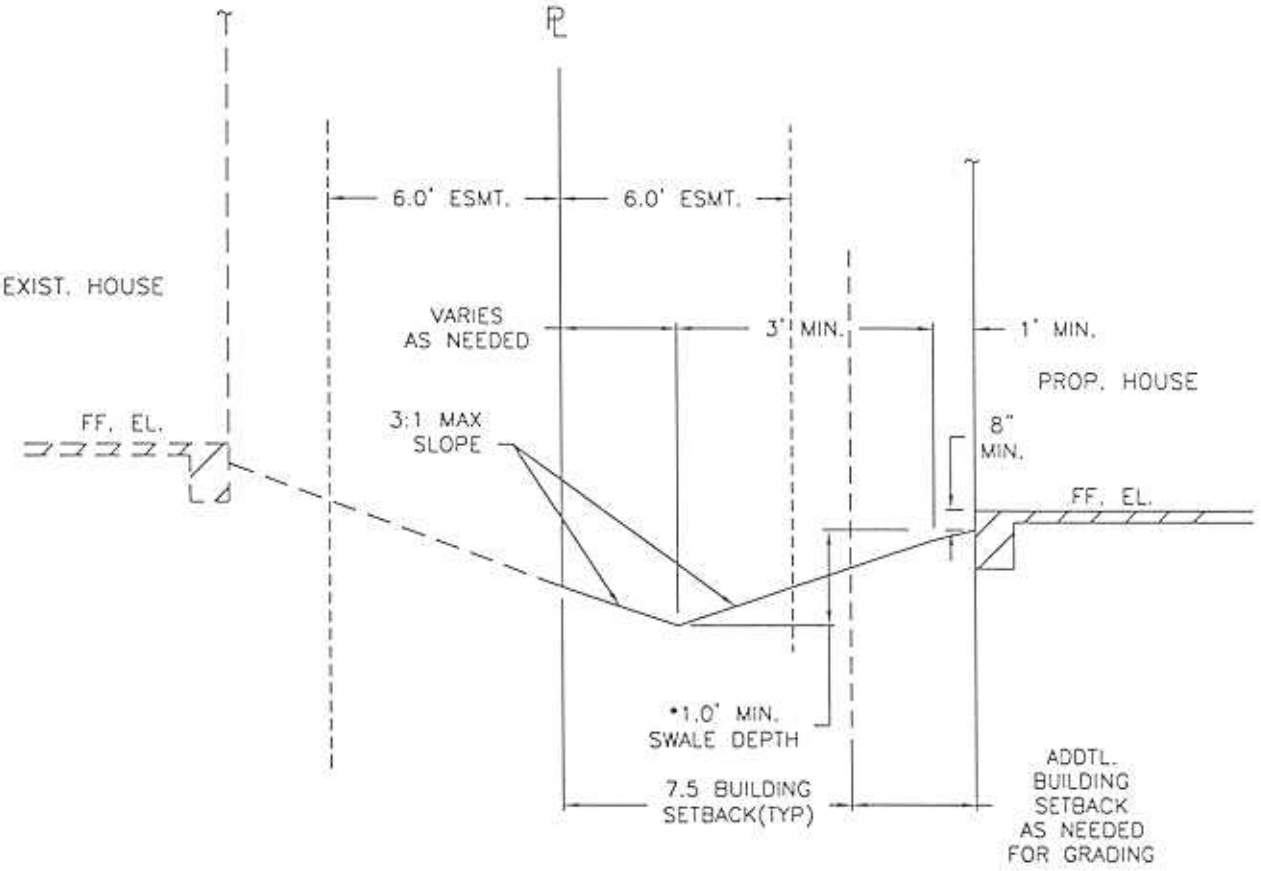
Plotted: Aug 29, 2003 - 2:33pm by kzogers



*WHEN FEASIBLE

TYPE "E" SWALE

(WHEN PROPOSED LOT IS LOWER THAN ADJACENT LOT AND THE REQUIRED SWALE CAN NOT BE GRADED CENTERED ON THE EXISTING PROPERTY LINE).

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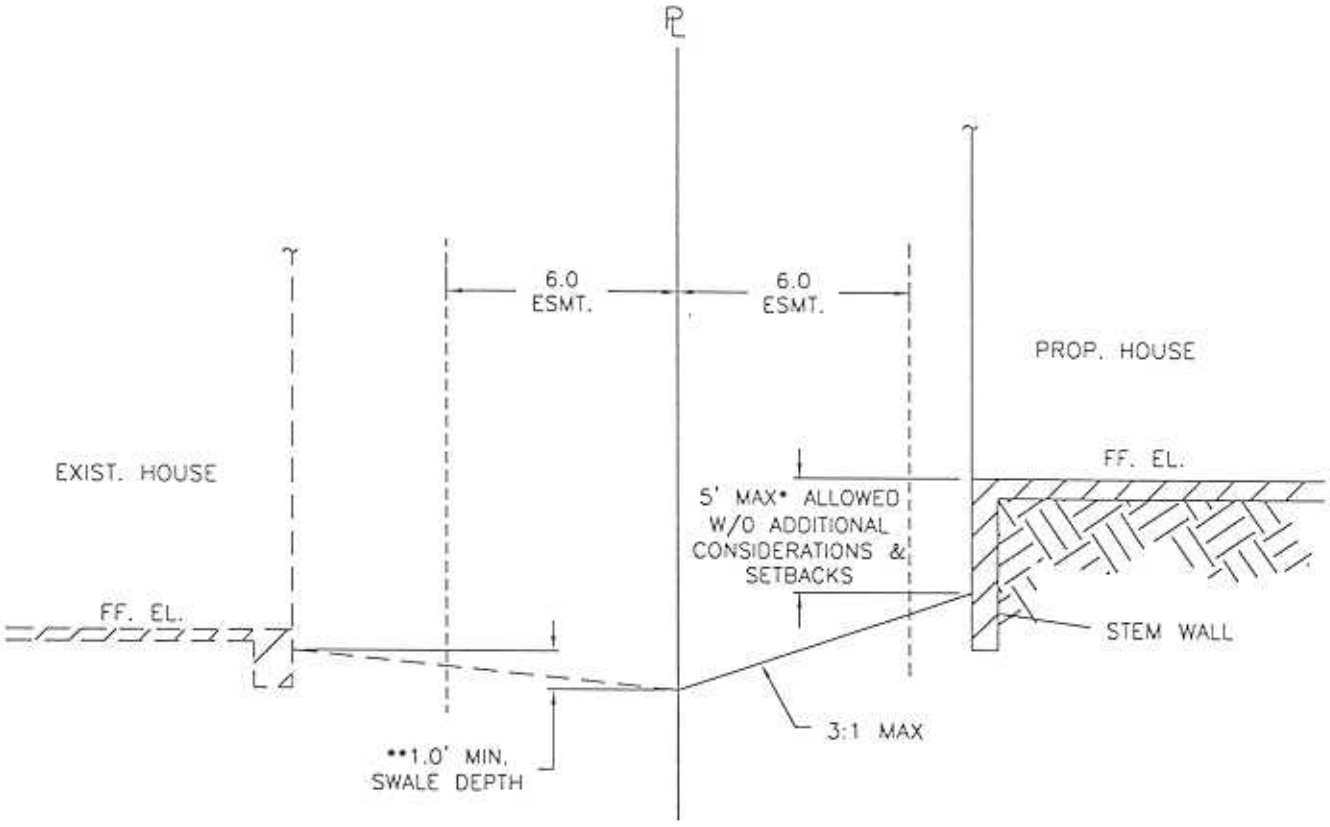
Plotted: Aug 29, 2003 - 2:33pm by kzogers

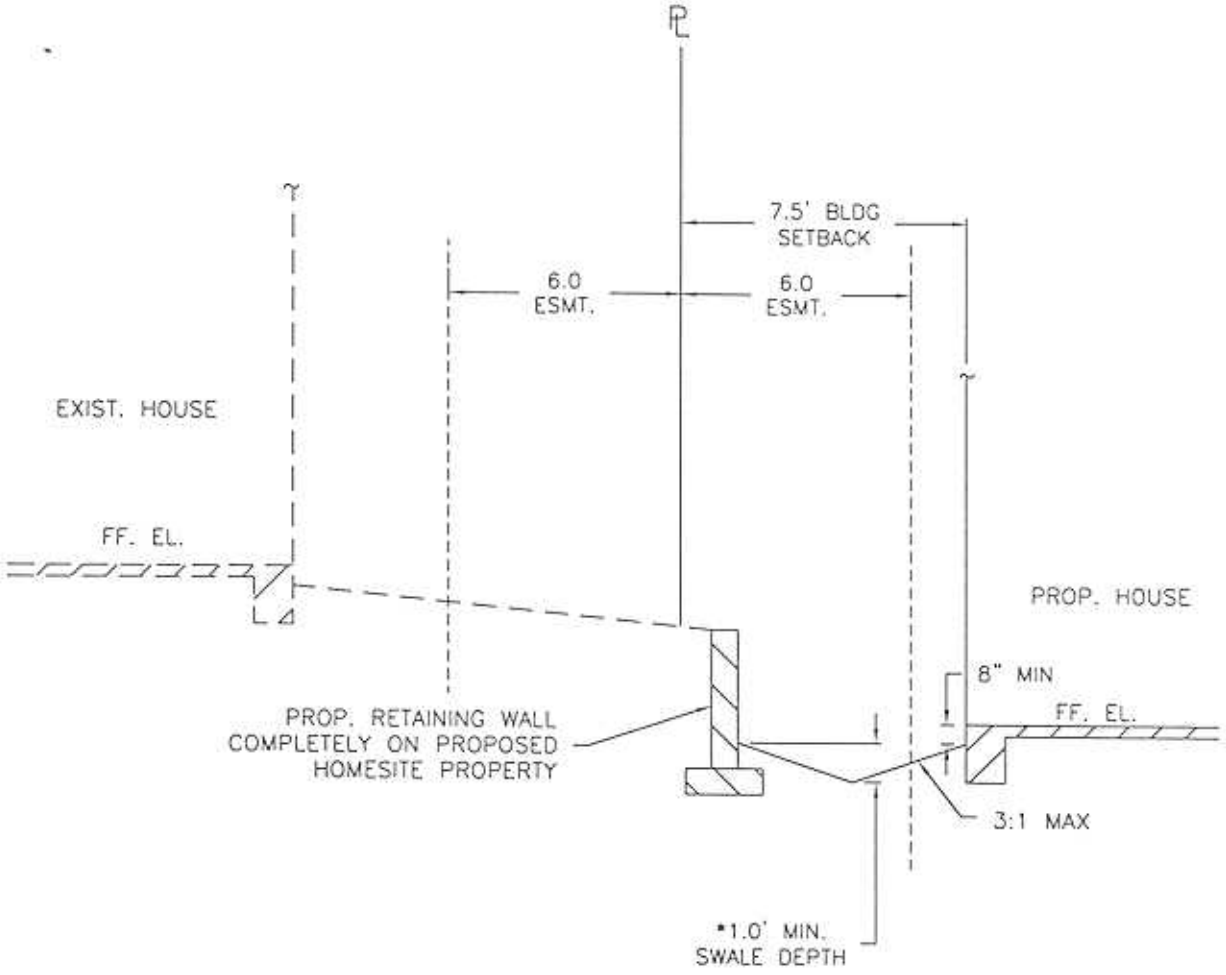


*NOTE: SEE SECTION 7.4 FOR APPROPRIATE CONSTRUCTION MATERIALS.
**WHEN FEASIBLE

TYPE "F" SWALE

K:\Ken Zagers\Residential Guideline\Lot Grading Exhibits\SWALE DETAILS A-G.DWG

Plotted: Aug 29, 2003 - 2:34pm by kzagers



*WHEN FEASIBLE

TYPE "G" SWALE

K:\Ken Zagers\Residential Guideline\Lot Grading Exhibits\SWALE DETAILS A-G.DWG

Plotted: Aug 29, 2003 - 2:34pm by kzagers

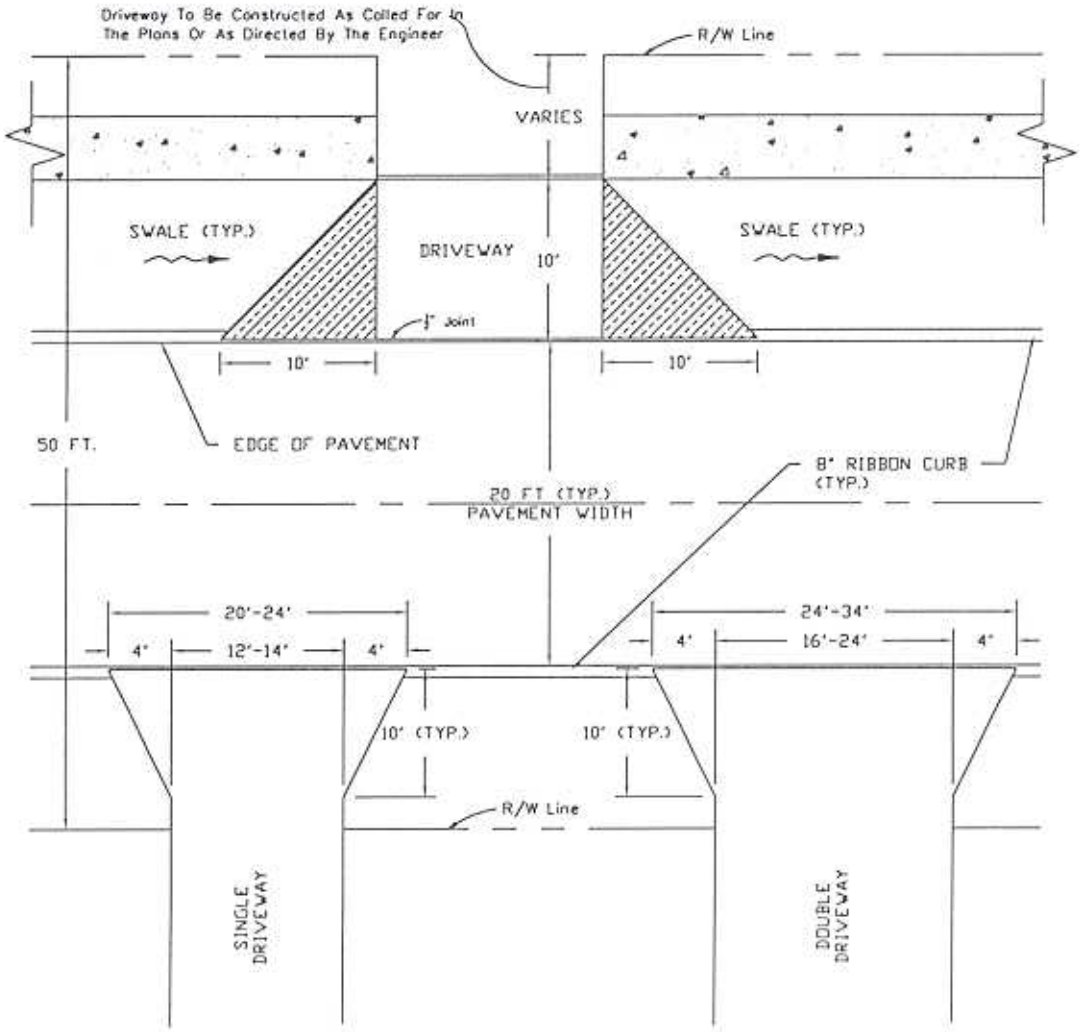
Group V – Driveway Details

Exhibit O Urban Flared Driveways

Exhibit P Driveway Geometry

Exhibit Q Driveway Material Detail

MINIMUM SIGHT DISTANCE



MAXIMUM AND MINIMUM DRIVEWAY WIDTHS

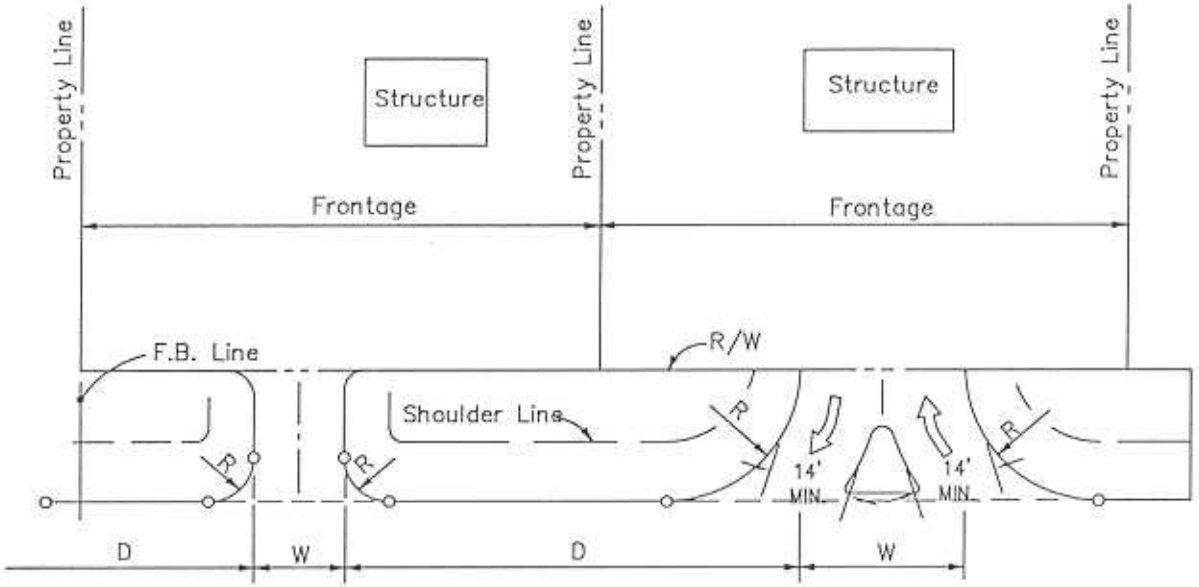
URBAN FLARED DRIVEWAYS

City of Deltona

EXHIBIT "O"

K:\Ken Zogers\Residential Guideline\Lot Grading Exhibits\EXHIBIT O.DWG

Plotted: Sep 16, 2003 - 10:15am by kzogers



LEGEND

- Return Radius Point Or Flare Point
- Buffer Areas
- F.B. Line — Frontage Boundary Line
- W — Driveway Width
- R — Outside Radius
- D — Distance Between Connections

ELEMENT DESCRIPTION	TWO LANE COLLECTOR	FOUR LANE COLLECTOR
	2-Way □	2-Way □
CONNECTION WIDTH W	24' Min. 36' Max.	24' Min. 36' Max.
RETURNS (Radius) R	25' = 500 ADT 50' = 500 ADT	50'
DIVISIONAL ISLAND (Throat Median)	4'-22' Wide	4'-22' Wide

□ "2-Way" refers to one "in" movement and one "out" movement i.e. not exclusive left or right turn lanes on the connection.

DRIVEWAY GEOMETRY

EXHIBIT "P"

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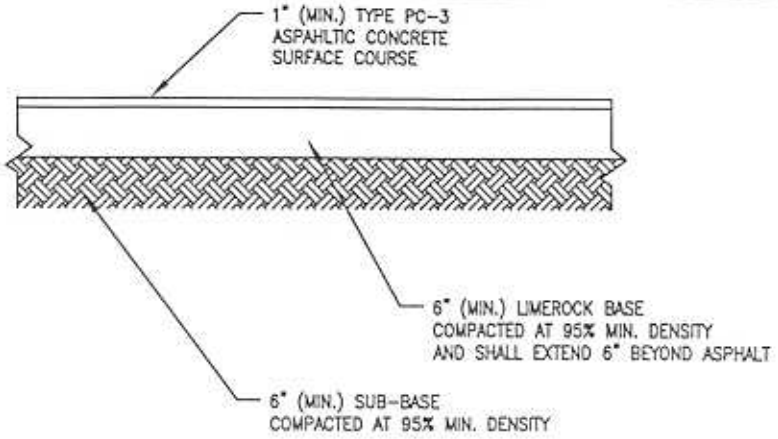
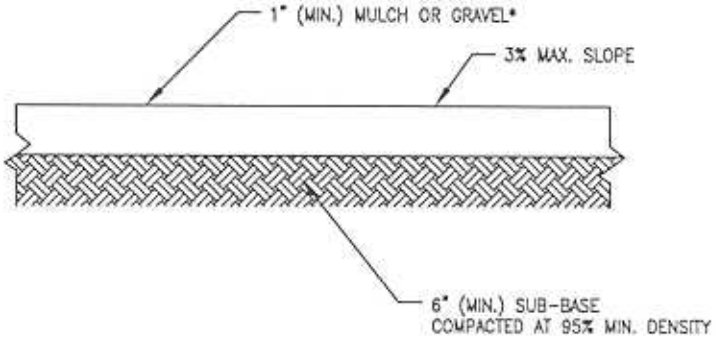
Plotted: Aug 04, 2003 - 8:37am by kzogers

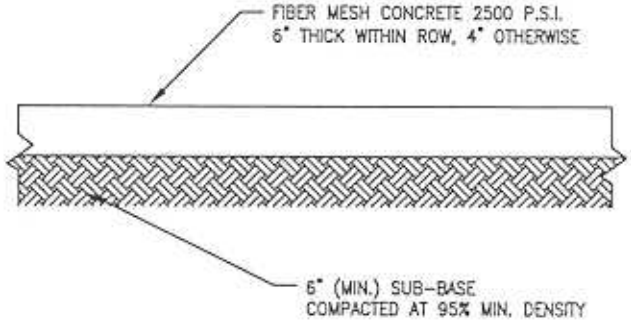


ASPHALT DRIVEWAY



* GRAVEL TO BE COMPACTED A 98% MIN. DENSITY

MULCH OR GRAVEL DRIVEWAY(NOT IN R.O.W.)



CONCRETE DRIVEWAY

NOTES

SUBSTITUTE TO BE APPROVED BY DESIGN ENGINEER.

DRIVEWAY MATERIAL DETAIL

EXHIBIT "Q"

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Plotted: Jul 29, 2003 - 2:45pm by kzogers